Parental Monitoring and Children's Internet Use: The Role of Information, Control, and Cues

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Abstract*

This paper explores how parental information and control can influence children's internet use in Chile. We designed and implemented a set of randomized interventions whereby approximately 7700 parents were sent weekly SMSs messages with (i) specific information about their children's internet use, and/or (ii) encouragement and assistance with the installation of parental control software. We separate the informational content from the cue associated with SMS messages and vary the strength of the cues by randomly assigning whether parents received messages in a predictable or unpredictable fashion. Our analysis yields three main findings. First, we find that messages providing parents with specific information reduce children's internet use by 6-10 percent. Second, we do not find significant impacts from helping parents directly control their children's internet access with parental control software. Third, the strength or salience of the cue associated with receiving a message has an independent impact on internet use.

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1. Introduction

Economists have long been interested in how parents can affect their children's actions. Becker (1974, 1981) introduced his famous "Rotten Kid Theorem" to show that, under certain assumptions, altruistic parents can control their children's actions indirectly through ex-post transfers. However, as Bergstrom (1989) pointed out, the Rotten Kid theorem does not hold in the presence of asymmetric information—i.e. when parents cannot observe their children's actions.[1] Parents may also be unable to control their children's actions simply because they lack information, whether or not there is asymmetric information per se (i.e. when children are equally uninformed about certain aspects of their own actions). Moreover, even with perfect information, parents may not be able to control their children's actions if they are unwilling to make negative transfers that impose large costs on the child (Weinberg, 2001; Berry, 2015). In these cases, parents may wish for the possibility of controlling their children's actions directly. All of these factors influence parents' ability to monitor their children's actions.

The main motivation for this paper is to explore the role of direct controls and lack of parental information in the context of home computers and internet use. To this end, we designed and implemented a set of randomized interventions to test the impact of sending parents weekly SMS messages containing specific information about their children's recent internet use and/or encouragement and assistance with installing parental control software. Providing parents with information about their children's internet use should help alleviate informational asymmetries or simply provide valuable information to parents and children. Encouraging parents to install parental control software can help parents bypass the need to incentivize their children or

[1] Bursztyn and Coffman (2012) provide evidence for such asymmetric information between parents and children in Brazil.

enforce rules related to computer use, assuming that parents are able to install and operate such parental control software.

Exploring the role of parents when navigating home technology is instructive because the informational asymmetries are likely to be pronounced and implementing direct controls can be difficult; children are often quicker to adapt to new technologies and parents may encounter challenges in understanding how children use technology. Previous research has shown that access to home computers and internet have negative or null effects on academic achievement (Malamud and Pop-Eleches, 2011; Fairlie and Robinson, 2013; Beuermann, et al. 2014; Vigdor, Ladd, and Martinez 2014). A recent study that exploits exogenous variation of internet penetration in Chile finds negative impacts of internet use on standardized test scores, especially for low-income families (Gonzalez, 2017). Given that computers represent such a versatile technology, the potential risks and benefits of computer use are likely to depend on parental involvement. Indeed, Malamud and Pop-Eleches (2011) found that parental rules for homework and computer use attenuated the negative effects of computer ownership, suggesting that parental supervision may be an important mediating factor.

A second motivation for this paper is to understand how and why the provision of information affects behavior. To this end, we designed our interventions to separate the informational content from the cue associated with the SMS messages, and attempted to vary the strength or salience of the cues by randomly assigning whether parents received messages in a predictable or unpredictable fashion. This was is inspired by research in neuroscience that suggests that human responses may be related to the predictability or novelty of the stimuli (Parkin, 1997; Berns et al., 2001; Fenker et al., 2008). It is also closely related to research in psychology on how different schedules of reinforcement affect behavior (Ferster and Skinner, 1957).

There is a large literature examining the impact of providing information to consumers, voters, students, parents, etc. (Alcott and Rogers, 2014; Finan and Ferraz, 2011; Jensen, 2010; Dizon-Ross, 2016). Moreover, a couple of recent papers study the effect of sending SMS messages to parents with information about their missed-assignment, attendance, and grades (Bergman, 2016; Bergman and Chan, 2017; Berlinski et al., 2017; Cunha, et al. 2017). However, these studies have not separated the effect on behavior due to the informational content of the message vs. the cue that is associated with getting the message itself.[2] There is also research examining how SMS messages can serve as reminders to promote beneficial changes to behavior in education (Castleman, 2015), health (Pop-Eleches et al., 2011) and savings (Karlan et al., 2014)). Some of these studies also consider the role of limited attention in explaining the effectiveness of SMS messages and reminders.[3] Nevertheless, our understanding of the salience or strength of these type of messages remains limited.[4]

We focus on a sample of children in 7th and 8th grade who received free computers and 12 months of free internet subscriptions through Chile's "Yo Elijo mi PC" (YEMPC) program in 2013. We have data on the intensity of internet use at the daily level from the internet service provider (ISP) which served all of the computers provided to the children in our sample. According to this data, children downloaded approximately 150MB of internet content daily, which translates to about 3 hours of internet use on a daily basis. This is similar to recent estimates from a 2015 PISA survey showing that children in Chile spent 195-230 minutes per day online, the highest rate

[2] Cunha, et al. (2017) compare the effect of providing parents with information vs. a message that emphasizes the importance of paying attention but these are distinct treatments from those in our study.
[3] Taubinsky (2014) and Ericson (2017) provide theoretical analyses of how limited attention and present bias can affect the effectiveness of messages and reminders.
[4] Bordala, Gennaioli, and Schleifer (2017) present a theory in which cues that surprise relative to previous norms affect choice. Bertrand et al. (2010) consider the effect of different cues in the context of a marketing field experiment.

among all the OECD countries surveyed (OECD, 2017). To put this in context, the American Academy of Pediatrics (AAP) recommends no more than 2 hours of screen time for children (AAP, 2016). Furthermore, over 75 percent of the parents in our baseline survey expressed the view that their children used too much internet or the wish to better control their children's internet use.

Our unique data enabled us to introduce a treatment that provided parents with information about their children's internet use. For this "information" treatment, we sent parents weekly SMS messages providing specific information from the ISP about the intensity of internet use, in terms of MBs uploaded/downloaded, over the previous week. For the "parental control" treatment, we sent parents weekly SMSs offering assistance with the installation of Windows 8 (W8) parental control software. We also incorporated a treatment arm that included both ISP information and assistance with W8 parental controls to test for possible interactions between these treatments.

To disentangle the informational content and the offer of assistance from the cue associated with SMS messages, we compare these treatments to a control group in which parents received weekly SMSs reminding them that children should make good use of their computers, a message that was included in every treatment. In addition, we attempted to vary the strength of the cue within each of our treatment arms by randomly assign parents to either receive the SMSs on the same day of the week (the "fixed" subgroups) or a on random day of the week (the "random" subgroups). All of these interventions lasted for 14 weeks.

We have three main sets of results. First, we find that households in which parents received ISP information about internet use had a 6 to 10 percent lower intensity of internet use during the treatment period relative to households in the control group. These effects persist in the weeks and months after treatment ended.

They do not reflect declines in parents' own internet use. This suggests that our temporary intervention providing information on internet use may have altered the permanent intra-household equilibrium. We also show that there are statistically significant reductions in use precisely on the days immediately after receiving the ISP information and this effect is more relevant in the early weeks of the experiment. Moreover, it is the SMS messages that convey the "bad news", i.e. that children used more internet than the reference group in a specific week, which produce a much larger decline in internet use. Thus, these findings confirm that it is the specific information provided to parents about their children's internet use that leads to a significant reduction of internet use.

Second, we do not find significant impacts from helping parents directly control their children's internet access. In particular, we do not find a difference in internet use between parents who were encouraged and provided assistance to install parental control software as compared with those in the control group who only received a generic cue. Take-up of this intervention was only 15 percent when measured in terms of the parents who actually responded to our messages. However, for those taking up the intervention, we do not find changes in internet use even on the days immediately after installing the parental control settings. We believe this finding reflects the considerable obstacles faced by low-income parents in implementing technological solutions for monitoring and supervising their children.

Third, we have several results that help us open the "black box" of how messages that contain information affect behavior. As mentioned above, by sending messages that vary the amount of information, we can show the important role of a message's informational content on reducing internet use. Our analysis also shows two additional findings that suggest the importance of salience. When we experimentally varied the

strength of the cue, we find that households who received SMSs on a random schedule experienced significantly greater reductions in internet use than those on fixed schedules, an effect similar in magnitude to the main effect associated with receiving the ISP information. Furthermore, we find that *even* the SMS messages sent to the control group had short-term impacts on internet use in the first weeks of the experiment, perhaps due to the novelty of the message.

Our paper makes several contributions: First, we identify real-time impacts of the provision of information on internet use, an important dimension of children's behavior at home that is often imperfectly observed to parents. Second, we use experimental variation to isolate the causal effect of providing parents with specific information about their children's behavior and helping parents exercise direct control over their children's behavior. Third, we isolate the impact of providing parents with specific information from the effect of a cue from receiving a message by using a control group in which parents received messages without this information. Such cues are likely to be an important part of any attempt to provide parents (or other economic actors) with information. Fourth, we explore the role of these cues by introducing experimental variation in how and when parents received the messages. Thus, this study provides a unique opportunity to explore factors that affect parental monitoring and to better understand how and why messages containing information affect behavior.

The paper is organized as follows: Section 2 provides some background on the Yo Elijo mi PC program. Section 3 introduces the experimental design. Section 4 describes the data used for the study. Section 5 explains the empirical strategy underlying the analysis. Section 6 presents the main findings. Section 7 discusses and interprets these findings. Finally, Section 8 concludes.

2. Background

We designed and implemented our experiment for the 2013 cohort of the YEMPC program. YEMPC is a Chilean government program that provides computers to 7th graders with high academic achievement from disadvantaged households. Students are eligible for the program if they have attained a sufficiently high grade point average (GPA) in 4th, 5th, and the first semester of 6th grade and if their household scored below a certain level on a measure of poverty used to determine eligibility for social programs called the Ficha de Protección Social (FPS).[5]

Figure 1 presents the timeline of the processes associated with the 2013 cohort of the YEMPC and with our experiment design. The timeline of YEMPC for each round is as follows: Eligible students are identified based on their FPS and GPA scores in September-October of the year prior to receipt of the computer (2012 in our case). In principle, each student who meets the FPS and GPA requirements is eligible to receive a computer; there is no application process. Students are then required to select a computer in November-December. A number of different options are available each year, including laptops and desktops with different features and specifications. Each computer was equipped with Windows 8 and Microsoft Office. Computers are distributed to students during the months of April and May. The computers are given in schools, at a ceremony organized by the municipality in which the student is enrolled. Beginning with the 2011 cohort, students with some types of computers also received 12 months of free internet service.

Our experiment considers students who entered 7th grade in 2013 and were selected to the program in November 2012. We focus on the 32,270 beneficiaries of this

[5] Carneiro et al. (2014) present a detailed description of the FPS instrument.

cohort who received free internet access with their computers starting in mid-2013 (there were a total of 52,122 beneficiaries in the 2013 cohort). Internet is provided through a private Internet Service Provider (ISP). After contacting families by phone (using administrative records) and asking them to participate in the experiment and to complete a telephone baseline survey, we ended up with a sample of 9,636 parents with a valid cell phone (to receive the SMSs) and who consented to participate in the experiment.[6]

In terms of access to computers and internet at home before receiving the YEMPC program, Gallego et al. (2017) document that 40% of beneficiaries had a PC at home, 23% had internet access at home, and 6% have a cell phone with internet access. In terms of where they have access to computer (different from home): 87% had access to a computer at school, 30% in a cyber-café, and 68% can access a computer´s friend. This implies that most of the kids in our sample had access to a computer and internet before the program started but that a much smaller fraction had personal computers and personal internet access. However, in terms of total internet use, the median student reported that time use was "access to internet some times in the week". This contrasts with an average time of about three hours of internet use *per day* in the baseline of our experiment that followed the distribution of computers to recipients. This suggests the YEMPC program dramatically increased internet use.

Is the increase in internet use beneficial for children? As mentioned earlier, previous research on the effect of internet use in Chile and in the United States indicates negative effects on academic achievement (Vigdor, Ladd, and Martinez 2014; Gonzalez, 2017). The American Academy of Pediatrics (AAP) recommends no more than 2 hours of

[6] Appendix Table 1 compares the students in our experimental sample with a broader sample of those who applied for a computer with an internet connection under the “Yo Elijo Mi PC” program. We do not identify economically relevant differences between the experimental sample and the broader sample.

screen time for children (AAP, 2016). Moreover, based on data from our baseline survey, 63% of parents say they wish to install parental control software and 36% of parents say their child uses too much internet. Finally, we estimate that a one-standard deviation increase in internet use increased the likelihood of parents saying their child uses "too much" internet by 4% points, suggesting that parental perceptions of their children's excessive internet use is related to actual use, albeit imperfectly. That said, even if internet use is not detrimental for children's outcomes, the findings in our paper are still important for understanding how information and cues affect behavior.

3. Experimental Design

The experiment consists of delivering weekly text messages to the 7,707 parents in our experimental sample. The SMSs differed in terms of content and the day of the week in which they were delivered. In terms of contents, we sent three types of SMSs using the following texts:

- SMS-only: "We hope your child makes good use of the Yo Elijo Mi PC laptop that he/she won".
- ISP: "We hope your child makes good use of the Yo Elijo Mi PC laptop that he/she won. Your child downloaded XX MBs the week of the DD-MMM, {"more than", or "similar to", or "less than"} what a typical child downloaded: YY MBs."[7]
- W8: "We hope your child makes good use of the Yo Elijo Mi PC laptop that he/she won. The Parental Control program of Windows 8 can help you supervise your child's computer use. Call us at XXX-XXXX for assistance."

[7] The "reference group" is used to compute the weekly average of MBs downloaded by a typical child.

Group T0 received the SMS-only message, group T1 received the ISP message, group T2 received the W8 message, and group T3 received both the ISP and W8 messages (in that order). For each group, half of the families received the treatments on a fixed day of the week (and we randomized the day on which they received the message) and half of the families received the messages on random days of each week. Table 1 show how the 7,707 families were divided into the different experimental groups.[8]

Specifically, we used information from a baseline survey and administrative data on internet use to implement a stratified randomization based on the following strata: (i) guardian's education (No High-School, High School, College), (ii) parent perception of whether the student stays too long in front of the computer (Yes or No, using information from a baseline survey), and (iii) internet use as total MBs downloaded between September and December 15, 2013 (using administrative data from the ISP provider).

The messages were sent weekly between 4pm and 5pm on different days of the week between December 23, 2013 and April 6, 2014. This period covers the summer vacation (from December, 23 2013 to March 6, 2014) and the school period (from March 7, 2014). We discuss the actual share of SMSs received in each treatment arm in Section 6.1.

4. Data

The main source of data for our study is administrative data on internet use for each beneficiary collected by the ISP provider. This includes daily information on MBs downloaded and uploaded. We received information for each beneficiary for the period

[8] We also have a "reference group" of 1,929 families which we use to compute internet use for the purposes of comparison to one of the experimental arms.

between September 22, 2014 and June, 17, 2015. This implies that we have information on internet use for the period before the SMS treatments started, for the period in which the SMSs were delivered, and for 12 weeks after the treatment was discontinued.

In addition, we used information from the baseline survey to conduct the stratified randomization and to control for several baseline characteristics in our main specifications. These include household data with information about the students and parents such as, student gender, guardian age, family composition, number of siblings, parents' education, parents' working conditions, and guardian´s perceptions of internet and computer use. We have information for all the individuals included in the sample, as this was part of the enrollment process.

Table 2 summarizes student and parental characteristics for our main experimental sample. The daily mean MBs download in the 3 months of the pre-treatment period was approximately 150 MB which corresponded to 186 minutes of predicted internet use. Almost all of the children in our sample live with their mothers, and over sixty percent also live with their fathers. Moreover, approximately three-quarters have a sibling living with them while fifteen percent also live with a grandparent. Our sample of students is 43 percent female and they have an average of 1.7 siblings. The average age of the guardian is 40 years old. Most of the guardians have secondary education, with almost half having completed it and another fifteen percent have some secondary education. The remainder have only an elementary education with just four percent having some higher education, which is not surprising given the target population of the Yo Elijo mi PC program.

During the treatment period, we were able to gather information about whether the SMSs sent were received on the cell phones of treated parents. This serves to measure the "technical" part of the take-up, as related to the actual delivery of the

messages. We also collected data on the installation of W8 parental control setting through our call center. Thus, this measure captures the take-up of the W8 treatment directly from us, though parents could also install parental control software by other means. We discuss and use this information in Table 4.

Then, after the delivery of the treatment was ended, we applied a brief phone interview between April and early May 2014 to examine some potential mechanisms underlying our estimated impacts on internet use. We were able to contact 5,001 parents who consented to participate in the survey. This is equivalent to 57% of the original sample. The lower rate is mostly a consequence of the difficulty in reaching parents on the phone, as the rejection rate of the survey was just about 14%. The survey includes a series of questions about parent recollections of receiving SMSs, the usefulness of the SMSs, and the decision to install the parental control software.[9]

Finally, in order to help in the interpretation of our results, we constructed a proxy for time use (in seconds) using information from students of the 2012 YEMPC cohort. We collected information on both MBs (downloaded and uploaded) and time of internet connection for a sample of 48,920 students for 125 days (from mid-April to early December, 2012). Using this information we estimated OLS regressions models in which time of internet use is a non-linear functions (including interactions) of Mb downloaded, Mb uploaded, dummies for the day of the week, dummies for holidays, and dummies for discrete levels of use (four categories that reflect higher, high, normal, low use). We use the specification with the highest R^2 (0.621) to impute time of internet use for our sample. We present these estimates to aid in the interpretation of our main results in the paper and present impact estimates in the Appendix as robustness checks.

[9] Appendix Table 1 presents a comparison of baseline characteristics between the main sample and the survey sample.

Table 3 shows balance in the main demographic characteristics for our sample across each of our treatment arms, T1, T2, and T3 relative to the control group T0. The F-test presented in the last column rejects balance across the treatments and the control group at the 10% level for just one variable. This corresponds to whether the child lives with their mother.[10] Still, the differences in averages for this variable across groups do not seem to be economically large. We control for this vector of covariates in some of our regression specifications and, not surprisingly given the balance across treatment arms, our coefficients remain largely unchanged.

5. Empirical strategy

We present two alternative regression approaches for estimating the impact of our main interventions on internet use. First, we analyze the impact of the different interventions by comparing average internet use across households allocated to the different groups. This allows us to identify the average effect on internet use over the entire treatment period. Second, we also analyze the effects of the actual reception of the SMS messages using an event study analysis in which we exploit within-event variation in internet use on a daily basis. This allows to better understand the mechanisms behind the changes in behavior.

In the first approach, we adopt the standard specification used to analyze randomized experiments by separately identifying the impacts of each treatment arm, T1, T2, or T3 relative to our control group T0:

$$Y_i = \beta' X_i + \delta_1 T1_i + \delta_2 T2_i + \delta_3 T3_i + \varepsilon_i$$

[10] Appendix Table 2 presents balance tests for the random/fixed schedule sub-treatments and Appendix Table 3 presents balance tests for the survey sample. We only observe two unbalanced variables for the random/fixed schedule comparisons (out of 15), and with small differences: the random-schedule households have slightly less parents with complete higher education (1 p.p.) and were present with a higher probability in the other category group for current employment status (1.p.p.).

where Y_i is a measure of internet use for household i,. For some specifications we also include a set of control variables (X_i). The coefficient on T1 captures the effect of receiving ISP information with respect to the control group T0, the coefficient on T2 captures the effect of receiving information on how to install parental controls with respect to the control group, and T3 captures the effect of receiving information on both ISP and how to install parental controls. To the extent that not all of the SMSs sent are actually received, these coefficients will reflects intention-to-treat (ITT) parameters. To the extent that there is imperfect compliance on this margin, these coefficients can be scaled up by the fraction of messages received (although as shown below, the vast majority of SMSs sent were actually received).

To further improve precision, we also consider an alternative regression model that accounts for the fact that group T3 effectively receives both of the treatments provided to groups T1 and T2:

$$Y_i = \beta' X_i + \delta_1 ISP\_Information_i + \delta_2 ParentalControls_i + \epsilon_i$$

where Y_i and X_i are defined as before, $ISP\_Information_i$ is an indicator for households that are either in group T1 or T3, and $ParentalControls_i$ is an indicator for households that are either in group T1 or T3. Thus, we estimate the impact of parents receiving ISP information regarding internet use whether they are in T1 or T3 and the impact of receiving information about W8 parental controls whether or not they are in T2 or T3. Note that this specification does require us to assume that there are no complementarities between the two separate treatments. As will be seen below, we do not observe any significant effects for T2 relative to the control group and the estimated impacts for T3 are similar to those estimated for T1. Therefore, we think that the assumption underlying this alternative model is fairly innocuous.

Second, we take advantage of the fact that we have daily information on internet use to estimate the dynamic effect of each SMS "event" on daily internet use on the days immediately preceding and following the day on which the message was sent. We stack all the events for each sub-treatment and estimate the following model:

$$Y_{ide} = \sum_{d=-3}^{-2} \theta_d D_d + \sum_{t=0}^{3} \theta_d D_d + \sum_{d=-3}^{-2} \theta_d^{ISP} D_d * ISP_i + \sum_{t=0}^{3} \theta_d^{ISP} D_d * ISP_i$$
$$+ \sum_{d=-3}^{-2} \theta_d^{PC} D_d * PC_i + \sum_{t=0}^{3} \theta_d^{PC} D_d * PC_i + \mu_e + e_{ide}$$

or, with abuse of notation (because we are not explicitly excluding *d* = -1)

$$Y_{ide} = \sum_{d=-3}^{3} \theta_d D_d + \sum_{d=-3}^{3} \theta_d^{ISP} D_d * ISP_i + \sum_{d=-3}^{3} \theta_d^{PC} D_d * PC_i + \mu_e + \varepsilon_{ide}$$

where *Y* and *i* are defined as before, *d* refers to the day, *e* refers to the event, *ISP* is a dummy that takes a value of 1 for households in the ISP information group, *PC* is a dummy that takes a value of 1 for households in the parental controls group, *D* refers to day dummy variables, and μ_e denote the event fixed effects. This approach allows us to estimate a vector of coefficients that capture differences in internet use with respect to day -1 (i.e., the day before actually receiving the treatment) for all the treatment groups. For instance θ_{-3} measures the difference in internet three days before receiving the message with respect to the day before the message was received for the control group, ($\theta_{-3} + \theta_{-3}^{ISP}$) is the same effect for households in the ISP information group, and ($\theta_{-3} + \theta_{-3}^{PC}$) for the parental control group.

We also estimate the impact of our sub-treatments in which we vary whether the SMSs are sent in a predictable or unpredictable fashion. To do this, we estimate the following regression model:

$$Y_i = \beta' X_i + \rho Random_i + \mu_i$$

where $Random_i$ equals 1 if the SMSs were sent on a random day of the week and 0 if the SMSs were sent on the same day of each week. The coefficient ρ captures the impact of receiving the message on a random day relative to a fixed day of the week.

Finally, we consider a specification that allows for the interaction of our main treatments that provide ISP information or parental controls with our sub-treatments which vary whether the SMSs are sent in a predictable or unpredictable fashion:

$$Y_i = \beta' X_i + \delta_1 ISP\_Info_i + \delta_2 ParentalControls_i + \rho_1 Random_i + \eta(ISP\_Info_i * Random_i) + \theta(ParentalControls_i * Random_i) + \mu_i$$

The coefficients η and θ indicate whether providing information and parental controls are complements (or substitutes) with the strength or salience of the cue.

6. Take-Up

We begin by showing the patterns of take-up using our administrative data in Table 4. Columns (1) and (2) confirm that households were correctly targeted to receive SMSs providing information about internet use from the ISP provider. From Panel A, those in groups T1 and T3 received approximately 82 percent of these SMSs whereas those in group T2 and the control group did not receive them. This is also apparent when using our alternative regression model in Panel B to estimate the combined impact of providing ISP Information from T1 and T3. Similarly, columns (3) and (4) confirm that households were correctly targeted to receive SMSs regarding the Windows 8 (W8) parental control software. Those in groups T2 and T3 received 83 percent and 81 percent of these SMSs while those in group T1 and the control group did not receive them at all.[11]

[11] Panel B does show a small but significant effect of the combined impact of ISP Information from T1 and T3 on the likelihood of receiving SMSs regarding W8 parental control software. This is a result of the small differences in take-up between T2 and T3.

The imperfect compliance in the administrative data represents cases in which the SMS messages were not delivered due to technical issues (i.e. server problems, lack of reception, etc.). However, as shown in Appendix Table 4, the vast majority of parents received at least one message (98% in the case of T1 and T2 and 97% in the case T3). Finally, columns (5) and (6) of Table 4 show that about 14 percent of households in treatment group T2 and 16 percent of households in group T3 received assistance from us with installing the W8 parental control software; again, as expected, these rates were zero in treatment group T1 and the control group.[12]

We also asked parents about their recollections of receiving SMSs, the usefulness of the SMSs, and their decision to install parental control software. Column (1) of Panel A in Table 5 indicates no significant differences in whether parents recalled ever receiving an SMS across the different treatment arms T1, T2 and T3, relative to a base of 86 percent in the control group. This is not surprising given that all households were sent a weekly SMS (though Panel B does suggest that slightly fewer parents who received the Parental Control interventions report to have ever received an SMS). However, column (2) indicates that, among parents in group T2 who only received an SMS regarding W8 parental controls, significantly fewer remembered what the SMS actually said as compared to the control group. In contrast, among parents in groups T1 and T3 who received an SMS regarding the ISP internet use, significantly more remembered what the SMS actually said as compared to the control group. This differential rate of recall may also explain some of the differences in the impacts between the IPS and W8 interventions.

[12] Again, Panel B shows a small but significant effect of the combined impact of ISP Information from T1 and T3 on the likelihood of installing the W8 parental control software as a result of the small differences in take-up between T2 and T3.

Columns (3)-(6) show whether, conditional on reporting the receipt of an SMS, parents found the SMSs useful and for specific purposes relative to the control group. For the most part, the patterns in Panel A and B are not surprising and present evidence that help us to understand the potential impacts of the treatments. Parents in groups T1 and T3 who received SMSs regarding the ISP internet use were significantly more likely to find these messages useful for being informed about internet use. Important for our study, while about 20% of parents in the control group discussed the SMSs with their kids, this percentage more than doubles for parents in groups that received information. In contrast, parents who received information about the parental controls SMSs were slightly less likely to discuss the messages with their kid.

Parents in groups T2 and T3 who received SMSs about the W8 parental controls were significantly more likely to find them useful for learning about tools that would be helpful to monitor use. We also find that, despite the fact that all treatment arms also contained a sentence reminding parents to ensure their children made good use of the computer, fewer households in treatment groups T1, T2, and T3 reported that their messages were useful for this purpose as compared to the control group which contained only this sentence. This may present a first indication for the limited attention of parents; including additional content in the SMS may have led parents to pay less attention to the first part of the SMS.

Column (7) indicates that parents in groups T2 and T3 who received information about the W8 parental controls software were more likely to install it. Yet there is also evidence that some parents in group T1 and the control group succeeded in installing parental control software despite not receiving any assistance from us. Furthermore, while the estimates are not significant, column (8) suggests that parents may have used the internet more themselves. The positive coefficients are consistent with the

possibility that parents increased use in order to supervise and monitor their children. Overall, our administrative and survey data suggest that the interventions worked as intended and that the actual content of the SMSs did matter. Nevertheless, take-up associated with installing the Windows 8 (W8) parental control software was quite low.

7. Main Results

This section describes our main results on the role of information, parental controls, and cues for parental monitoring and supervision. The analysis of information and parental control is mainly based on Table 6 and Figure 2; that of cues is based on Table 7 and Figure 5. Both tables are structured in a similar fashion to the tables showing take-up: Panel A displays the impact separately for each treatment arm T1, T2, and T3 relative to the control group; Panel B displays the combined impact of providing ISP Information from T1 and T3 as well as the combined effect of providing Parental Control software from T2 and T3. In each panel, we show the overall impact and the separate impacts for weekdays and weekends.

7.1 Information

7.1.1 Aggregate impacts

We begin with a discussion of the aggregate impacts of providing parents with ISP information on the intensity of internet use. Across the different specifications in Panel A of Table 6, there is evidence that households in group T1 in which parents received the ISP information about internet use had lower intensity of internet use over the treatment period. The daily reduction of 11-16 megabytes downloaded represents a 6-10 percent decrease relative to the control group. The estimates are more precise with the inclusion of the control variables, and only slightly larger in magnitude for the

weekend as compared to weekdays. The impacts for households in group T3, in which parents were provided with both information about internet use and help installing parental controls, are negative but somewhat smaller in magnitude and less significant than those for T1. A broadly similar pattern is observed in Panel B where the increased precision yields a consistently significant (combined) impact of providing ISP Information from T1 and T3.

These results suggest that providing parents with specific information about their children's internet use does lead to a significant reduction of 6-10 percent in contemporaneous internet use. This translates to a daily reduction of about 7 minutes of internet use in households that received the ISP information intervention (see Appendix Table 5 for estimates in terms of predicted minutes of use). We take this as evidence of a reduction in children's internet use because we did not observe declines in parents' report of their own use (see column 8 of Table 5).

For the most part, the impact of our interventions are very similar across weekdays and weekends. This may be because the patterns of internet use and parental monitoring do not vary between weekdays and weekends. Indeed, we do not see large differences in internet use for the control group between weekdays and weekends; average internet use is 169.4 and 167.6 for weekdays and weekends respectively. However, it is also possible that there are countervailing forces at play. For example, children's demand for internet may be higher during weekends but the ability of parents to monitor their children's internet use may also be correspondingly greater. As a result, the equilibrium level of use both with and without our interventions may end up being quite similar across weekends and weekdays. Alternatively, the similarity in treatment effects across weekdays and weekends can be a consequence that our

interventions affected behavior that change internet use in a permanent way across all days of the week.

7.1.2 Event study

We also explore the high-frequency dynamics of our interventions by implementing an event study analysis that exploits the timing of the messages within each week. The results are presented in Panel A of Figure 2 which plots coefficient estimates for the control group (SMS-only), the information treatment (ISP info) group, and the parental control treatments (PC). Day 0 marks the day on which the SMSs are received each week, although the messages were received in the afternoon so we may expect larger impacts on the following day (day 1). For ease of comparison, we normalize all of coefficients to equal zero on the day prior to receipt of the SMS (day -1). These coefficients are also presented in Appendix Table 6 along with their statistical significance.

We do not observe a trend for any of the groups in the days preceding receipt of the SMS (days -3 to -1). However, we do see significant difference emerge as the SMSs are received by the households. Internet use starts declining for the ISP Info group on day 0, declines further on day 1, and remains below the internet use in the pre-treatment period. The plots for the control group does not follow the same pattern. While there is a small decrease in day 1, this quickly reverts to the level of the days before the messages were sent. This supports the results of the previous section by confirming that it is the receipt of the SMS messages themselves that leads to a discernible effect on internet use.

The impact associated with the actual content of the message received by the ISP-info group is shown in Panels B and C of Figure 2. In particular, we split the sample

between those receiving a message stating that internet use in the previous week was "above" the mean of the reference group and those stating that internet use in the previous week was the "same or below" the mean. These results indicate that the observed effects in Panel A are driven by those SMS messages containing "bad news" for the parents. We do not see a similar pattern for the other two groups, which suggests this is not explained by mean-reversion in internet use. This further confirms that it is the actual content of the message matters and not simply because of the receipt of the SMS messages.

To summarize, these results suggest that providing parents with information about their children's internet use helps to alleviate their lack of information. By having a control group that also receives an SMS message, we can isolate the impact of information from the cue associated with the message itself. Moreover, the evidence from our event study analysis that the message content drives the impacts only serves to reinforce the view that it is the information itself which generates the causal impact on internet use.

7.2 Parental Controls

In this section, we use Table 6 and the event study framework in Figure 2 to consider the impact of offering assistance with installing parental control software on the intensity of internet use.

Looking at Panel A of Table 6, we see no significant effects for households in group T2 in which parents were provided with information about installing parental controls; if anything the coefficients are slightly positive. There are also no significant effects in Panel B where we estimate the (combined) impact of offering parental control software from T2 and T3; the point estimates are all clustered close to zero. Thus, the

aggregate data indicates that offering parents with assistance to install parental control software is not an effective way of changing behavior. This conclusion is also confirmed by the results from the event study analysis. In contrast to the patterns observed for the informational treatment, Figure 2 shows no discernable impact of parental control intervention on intensity of internet use in the days immediately following receipt of the SMS message.

As a further exercise, we consider an alternative event-study analysis in which we estimate the short-term impact of actually installing W8 parental control software. Since we provided assistance with installing parental control software to families in treatment groups T2 and T3, we know the precise date on which each of the 564 parents who called received this assistance. These dates are staggered through January (after which no more calls were received) which allows us to estimate an event study that controls for seasonality, similar to those used in estimating the impact of receiving an SMS. The results of this analysis are shown in Figure 3 and Appendix Table 7 which indicate no significant short-term impacts in the days immediately after installation of the W8 parental control software. Given that the decision to install parental control software could be endogenous to internet use, these findings need to be interpreted with care. However, they are consistent with the long-term estimates from comparisons across our main treatment groups.

The absence of significant impacts from providing assistance for installing parental control software could indicate that parents already have access to other means of controlling their children's computer use. This may also explain the low rate of take-up for this intervention. Alternatively, the low rate of take-up could reflect the considerable obstacles faced by low-income parents in implementing technological solutions for monitoring and supervising their children. As noted previously, parents in

this treatment arm were more likely to report learning about tools that can be helpful in monitoring their children. But perhaps such parents need more hands-on assistance to actually install and use parental control software on their children's computers.[13] Moreover, installing and operating parental control software can impose substantial time costs which may lead to procrastination, status-quo bias, and other biases that arise with the demand for commitment devices (see Bryan et al., 2010 for a review).

7.3 Cues

As explained above, our interventions were designed to separate the informational content and the offer of assistance with parental control software from the cue associated with the SMS messages. This section presents additional evidence suggesting that the cues themselves also play an important role in affected parental behavior.

First, we use our event study framework to show that SMS messages sent to the control group had short-term impacts in the first weeks of the experiment. Figure 5 and Appendix Table 8 present the impacts from the event study for each treatment group during the first and second half of the treatment period. We will discuss the implications of these patterns for the persistence of our main interventions in the subsequent section. However, it is notable that there is a negative and statistically significant decrease of about 10 MBs one day after the SMS message was received for the control group during the first half of the treatment period. This suggests that the salience of the message also matters since the SMS messages without specific information on internet use are likely to be more salient at the beginning of the experiment.

[13] We have examined which parental characteristics predict take-up of the W8 parental control software. The strongest predictors are the gender of the student (less likely to install for females) and the stated intention to install parental control software in the baseline survey.

Second, we consider the effect of varying the strength of the cue associated with messages by sending them in either a predictable or unpredictable fashion. For each treatment arm, a random subset of households received SMSs on the same day of the week (this fixed day was randomly drawn among households) while the remainder of households received SMSs on a random day of the week.[14] Table 7 examines the effect of receiving SMSs on a random versus a fixed schedule for all the treatment arms combined. There is strong evidence that households who received SMSs on a random schedule had greater reductions of 10-15 MBs in daily internet use than households on fixed schedules. This is similar in magnitude to the main effect associated with receiving ISP information relative to the control group, and suggests that the strength of the cue associated to the message is as important as the message itself.[15]

We believe these findings are consistent with research in neuroscience and psychology finding that unpredictable and novelty stimuli have larger impacts (e.g. Parkin, 1997; Berns et al., 2001; Fenker et al., 2008). They are also related to research in behavioral economics that emphasizes the role of inattention in the context of reminders (e.g., Karlan, et al. 2014, Taubinsky 2014, Ericsson, 2017). One alternative explanation for these patterns is that random schedules allow for more flexible responses by parents when receiving a message is not as convenient on some days (and the impact of repeated messages is non-linear). In this case, we would expect to find heterogeneous treatment effects by the day of the week in which the message was

[14] Appendix Table 10 presents regressions of take-up for the random/fixed schedule sub treatments. Results imply small differences in take-up using administrative data in installation of W8 in random schedule group within the T2 treatment group, and negative differences in the percentage of messages received against the random schedule households in the T3 group.

[15] In Appendix Table 11, we estimate a specification that estimates the effect of random vs. fixed schedules separately for each type of treatment. Receiving SMSs on a random schedule leads to negative impacts in every treatment arm, although it is smaller and insignificant among households that received information on parental controls. The fact that the control group also shows differential effects by random vs. fixed schedules suggests that the strength of the cue provided by the random schedule also affects messages without specific informational content.

delivered. However, we do not find statistically significant differences across days. A second alternative explanation is that parents pay more attention to SMSs sent on a random schedule because they (mistakenly) interpret them as being sent actively by someone monitoring their internet use, whereas SMS messages sent on a fixed schedule are more likely sent through an automated process; in reality, all of the messages were automated. While we cannot completely rule out this possibility, it is worth noting that the differences between random and fixed schedules are even larger in magnitude for the control group (as discussed in Section 8.3), where the messages do not contain any specific information about their children's internet use.

8. Further Results

8.1 Dynamics

Did the impacts associated with our interventions display different dynamics during the treatment period? We begin with a broad look at the patterns over time in Figure 4 which shows the treatment effects for each week in the pre-treatment period, treatment period, and post-treatment period (relative to the control group). We observe the initial impacts of the information treatment build up during the first 4 weeks of treatment and then appear to stabilize through the rest of the treatment period. These results are confirmed in Table 8, which presents the coefficient estimates for the impact of each treatment for the first-half of the treatment (from weeks 1 to 7) and for the second half of the treatment (weeks 8 to 14).

Figure 5 presents the impacts from the event study for the first and second half of the treatment period. Results in both panels indicate that the dynamic effects of providing ISP information were stronger in the first-half of the treatment period. Appendix Table 8 presents the econometric results corresponding to these tables. They

show sizeable decreases in internet use of approximately 13 megabytes on the day the SMS was received and 20 megabytes one day after receipt of the SMS. In contrast, the effects in the second half of the sample, while still negative, are not statistically significant.

Next we decompose the heterogeneous response in the first and second half of the treatment period between the random and fixed subgroups. In Figure 6, we plot the relative impact of receiving an SMS message in an unpredictable fashion for each week in the pre-treatment, treatment and post-treatment periods. One can observe that the (negative) impact becomes larger in magnitude during the second part of the treatment period. This is not surprising if it takes parents some time to discern whether the messages are arriving in predictable or unpredictable fashion (parents were not informed about the manner in which the SMSs would be delivered). A similar pattern emerges in Figure 7 where the short-term effects of the fixed and random groups are similar in the first half of the treatment period, but only observed for the random group by the second part of the treatment period

These results provide complementary evidence on why the cues associated with an SMS message have an impact in our analysis. The different dynamics of random versus fixed messages during the first and second part of the intervention are consistent with the view that the increased strength of the cue for random-schedule messages should be more relevant in the second part of the intervention after recipients on the fixed-schedule have likely become accustomed to receiving their messages on the same day every week.

8.2 Persistence

If our interventions provided parents with new tools to address the challenge of monitoring and supervising their children, we would expect these impacts to persist. On the other hand, if parents depend on the SMSs themselves to help them monitor and supervise their children, these effects would likely disappear when they stop receiving their SMSs. In order to answer this important question, we analyze the impact of our treatments during the period after the interventions had ended (i.e. the "post-treatment period").

In Figure 4, which also shows the treatment effects for each week in the posttreatment period (relative to the control group), we observe that the treatment effects remain at a similar level even after the interventions conclude in week 14. This evidence suggests that our main impacts did persist following the treatment period. A similar picture emerges in the regression results presented in Table 8, which confirm that in the post treatment period (weeks 15 to 26) there are significant impacts even after the treatment ends, at roughly the same order of magnitude as the treatment impacts during the last weeks of the treatment period.[16] In contrast, when we use the event-study framework, we do not find any significant effect in the post-treatment period when the SMSs were not actually received. These results are shown in Figure 8 which presents the impacts from the event study for the first and second half of the treatment period and the post-treatment period for the fixed schedule sub-treatment.[17]

[16] The experiment took place during both the vacation period (from December, 2013 to early March 2014) and the school period (from early March onwards). This has an important overlap with the analyses we perform in this section. Appendix Table A13 estimates treatment effects for the last two weeks of the vacation period and the first two weeks of the school period in order to compare the effect of the treatment while in vacation and while in school, These results suggest the treatment effects are not substantially different for the vacation and school period and, therefore, we conclude that the dynamic effects we present in this section are probably unrelated to this alternative explanation.

[17] We only use information for the individuals who received messages on a fixed day of the week because it is not obvious how to show "placebo" impacts in the post-treatment period for the subsample of individuals who received messages on a random day of the week.

These results shed light on the mechanisms underlying our main results. The fact that our main impacts did persist following the treatment period while the event-study responses disappeared in the post-treatment period, suggests that the intervention affected internet use not simply through a direct effect of the SMSs that might help parents to better monitor and supervise their children. Rather, the tools provided by this intervention may have changed the equilibrium use over the initial intervention period and, therefore, led the treatment effects to persist even after the SMSs stopped.

8.3 Interactions between treatments

We also consider the interaction between our main treatments that sent SMSs providing ISP Information about internet use and reminders/assistance for installing Parental Controls software with our sub-treatments that varied whether those SMSs were received on a random or a fixed schedule. These interactions effects are displayed in Table 9 for our combined treatments and in Appendix Table 10 for the separate treatments.

In either case, we observe main effects that are similar to the ones estimated in previous tables: receiving SMSs with ISP Information about internet use (for those on a fixed schedule) leads to significantly lower internet use; receiving reminders/assistance for installing Parental Controls software (for those who received them on a fixed schedule) has a negative but statistically insignificant impact on internet use; and receiving SMSs on a random schedule leads to very large and significant reductions in internet use.

The interaction effects between ISP information and indicators for a random schedule are consistently positive, albeit not significant (a similar pattern holds with respect to the interaction between the random schedule and the parental controls

treatment). This suggests that ISP information and any cue associated with a random schedule are substitutes, not complements. In other words, providing specific information appears to crowd out the effect of the cue associated with the message.

9. Conclusion

Parents are often confronted with the challenge of supervising their children's actions. This challenge has become even more pressing with the increasing availability of internet access at home which may displace productive activities (and expose students to inappropriate content). The paper examines the role of imperfect information among parents and the potential for direct parental controls in affecting children's internet use. We designed and implemented a set of randomized experiments to test whether the intensity of children's internet use responds to the provision of specific information about children's internet use and to the offer of assistance with the installation of parental control software. The sample includes children in 7th and 8th grade who received free computers and 12 months of free internet subscriptions through Chile's "Yo Elijo mi PC" (YEMPC) program in 2013, and we take advantage of detailed information on the intensity of internet use at the daily level from the internet service provider (ISP) which served all of the computers provided to the children in our sample.

Our results show that providing parents with information about their children's internet use leads to substantial reductions in use: households in which parents received ISP information about internet use had significantly lower intensity of internet use during the treatment period as compared to households in the control group. We observe statistically significant reductions in use precisely on the days immediately after receiving the ISP information. Furthermore, it is those SMS messages indicating that children used more internet than the reference group in a specific week, which

produce the largest declines in internet use. We find no impact of receiving assistance with the installation of parental control software on the intensity of internet use. Moreover, we do not observe short-term impacts of actually installing parental control software among the families that received assistance.

Taken together, these findings indicate that providing parents with specific information about their children's internet use affect behavior while providing parents with parental control software does not. The fact that the impacts of information effects persist after treatment ends suggests that our temporary intervention may have altered the equilibrium level of internet use and alleviated the problem of imperfect information in a more permanent way.

We also find strong evidence that households who received SMSs with an unpredictable schedule experienced significantly greater reductions in internet use than those on predictable schedules, an effect similar in magnitude to the main effect associated with receiving the ISP information. In addition, we find that the SMS messages sent to the control group had short-term impacts on internet use in the first weeks of the experiment, perhaps due to the novelty of the message. These findings suggest that the cues associated with messages have an independent effect on behavior and that the strength of such cues is an important determinant of our outcomes. Thus, our study sheds light on the role of information and cues in affecting behavior.

References

Alcott, Hunt and Todd Rogers (2014) The Short-Run and Long-Run Effects of Behavioral Interventions: Experimental Evidence from Energy Conservation" *American Economic Review* 104(10): 3003–3037

American Academy of Pediatrics (2016) "Policy Statement: Media Use in School-Aged Children and Adolescents", Pediatrics 138 (5).

Becker, Gary S. (1974) "A Theory of Social Interactions." *Journal of Political Economy* 82: 1063-94.

Becker, Gary S. (1981). *A Treatise on the Family*. Cambridge, Mass.: Harvard Univ. Press.

Bergman, Peter (2016) "Parent-Child Information Frictions and Human Capital Investment: Evidence from a Field Experiment Investment". Working paper.

Bergman, Peter and Eric W. Chan (2017) "Leveraging Parents: The Impact of High-Frequency Information on Student Achievement". Working paper.

Bergstrom, Theodore C. 1989. "A Fresh Look at the Rotten Kid Theorem—and Other Household Mysteries." *Journal of Political Economy* 97 (5): 1138–59.

Berlinski, Samuel, Busso, Matias, Dinkelman, Taryn and Claudia Martinez (2016) "Papás al Día: Using high frequency text messaging to reduce parent-school information gaps and improve school outcomes" Working paper.

Berry, James (2015) Child Control in Education Decisions: An Evaluation of Targeted Incentives to Learn in India. *Journal of Human Resources* 50(4): 1051-1080

Berns, Gregory et al. (2001) "Predictability Modulates Human Brain Response to Reward" *The Journal of Neuroscience* 21(8):2793–2798

Beuermann, Diether, Julian Cristia, Santiago Cueto, Ofer Malamud, and Yyannu Cruz-Aguayo. 2015. "One Laptop per Child at Home: Short-Term Impacts from a Randomized Experiment in Peru." *American Economic Journal: Applied Economics* 7(2): 1-29.

Bordalo, Pedro, Nicola Gennaioli, and Andrei Shleifer (2017) "Memory, Attention, and Choice", NBER Working Paper No. 23256

Bryan, G., D. Karlan, S. Nelson (2010) "Commitment Devices" *Annual Review of Economics* 2: 671-698

Bursztyn, Leonardo and Lucas Coffman (2012). "The Schooling Decision: Family Preferences, Intergenerational Conflict, and Moral Hazard in the Brazilian Favelas," *Journal of Political Economy* 120(3): 359-397

Castleman , Benjamin L. (2015) *The 160-Character Solution: How Text Messaging and Other Behavioral Strategies Can Improve Education*. Johns Hopkins University Press

Cunha, Nina, Guilherme Lichand, Ricardo Madeira, and Eric Bettinger (2017) "What is It About Communicating With Parents." Mimeo

Dizon-Ross, Rebecca (2016), "Parents' Beliefs and Children's Education: Experimental Evidence from Malawi," Working paper.

Ericson, K.M. (2017) "On the Interaction of Memory and Procrastination: Implications for Reminders, Deadlines, and Empirical Estimation" *Journal of the European Economic Association*, 15(3): 692–719

Fairlie, Robert, and Jonathan Robinson. 2013. "Experimental Evidence on the Effects of Home Computers on Academic Achievement among Schoolchildren." *American Economic Journal: Applied Economics* 5(3): 211–240.

Fenker, Daniela B. Julietta U. Frey, Hartmut Schuetze, Dorothee Heipertz, Hans-Jochen Heinze, and Emrah Duzel (2008) "Novel Scenes Improve Recollection and Recall of Words" *Journal of Cognitive Neuroscience* 20(7):1250–1265

Ferster C B and B F. Skinner. (1957) *Schedules of Reinforcement*. Englewood Cliffs, NJ: Prentice-Hall

Finan, Frederico and Claudio Ferraz (2011) "Electoral Accountability and Corruption in Local Governments: Evidence from Audit Reports". *American Economic Review* 101: 1274-1311.

Gallego, Francisco, David Preiss, and Alejandro Saenz (2017) "From access to use: Determinants of Internet use in a state sponsored free Internet program for children". Manuscript.

Gonzalez, Teresita (2017) "Efectos del Mayor Acceso a Internet Movil en el Desempeno Academico. Evidencia para Chile." Manuscript

Jensen, Robert. 2010. "The (Perceived) Returns to Education and the Demand for Schooling," *Quarterly Journal of Economics* 125 (2): 515–48.

Karlan, Dean, Margaret McConnell, Sendhil Mullainathan, Jonathan Zinman (2014) "Getting to the Top of Mind: How Reminders Increase Saving" *Management Science* 62(12): 3393-3411

Malamud, O. and C. Pop-Eleches, C. 2011. "Home Computer Use and the Development of Human Capital." *Quarterly Journal of Economics* 126: 987–1027.

OECD (2017), PISA 2015 Results (Volume III): Students' Well-Being, PISA, OECD Publishing, Paris. (http://dx.doi.org/10.1787/9789264273856-en)

Parkin, Alan J. (1997) "Human memory: Novelty, association and the brain" *Current Biology* 7: 768–769

Pop-Eleches C, Thirumurthy H, Habyarmina J, Graff Zivin J, Goldstein M, DeWalque D, MacKeen L, Haberer J, Sidle J, Ngare D, Bangsberg D (2011) "Mobile phone technologies

improve adherence to antiretroviral treatment in resource-limited settings: a randomized controlled trial of text message reminders". *AIDS* 25(6)

Taubinsky, D. (2014) "From Intentions to Actions: A Model and Experimental Evidence of Inattentive Choice" Mimeo.

Vigdor, J., and H. Ladd., Erika Martinez 2014. "Scaling the Digital Divide: Home Computer Technology and Student Achievement." *Economic Inquiry* 52(3): 1103-1119.

Weinberg, Bruce (2001), "An Incentive Model of the Effect of Parental Income on Children," *Journal of Political Economy* 109(2): 266-280

Table 1: Sample Size by Treatment and Subtreatment

Treatment	Group	Fixed Day	Random Day	Total
T_1	ISP	963	964	1927
T_2	W8	965	963	1928
T_3	ISP + W8	962	962	1924
T_0	SMS-only	964	964	1928
	Total	3853	3854	7707

Notes: The sample was stratified by Guardian's education (No High-School, High School, College), Parent perception of whether the student stays too long in front of the computer (Yes or No) and Internet Use as the total MB downloaded between September and December (the 15th).

Table 2: Summary Statistics

	Mean	S.D.
Panel A: Student Characteristics		
Daily mean download, pre	153.51	179.77
Average daily use in minutes, predicted, pre	186.37	162.81
Live with mother	0.96	0.20
Live with father	0.62	0.49
Live with Brother/Sister	0.76	0.42
Live with Grandfather/Grandmother	0.15	0.36
Female	0.43	0.49
Number of siblings	1.72	1.28
Panel B: Guardian Characteristics		
Guardian Age	40.42	7.78
What is your education level?		
Elementary incomplete	0.10	0.30
Elementary complete	0.14	0.35
Secondary incomplete	0.15	0.36
Secondary complete	0.47	0.50
High incomplete	0.04	0.20
High complete	0.09	0.29
What is your current employment status?		
Working full time	0.33	0.47
Working part-time	0.13	0.33
Not working looking for a job	0.06	0.23
Not working not looking for a job	0.47	0.50
Other	0.02	0.14

Notes: This table presents estimated means (Column 1) and standard deviations (Column 2) for students included in the experimental sample.

Table 3: Balance by Treatment

	(1) T_1	(2) T_2	(3) T_3	(4) SMS-Only	(5) P-Value(F-Test)
Panel A: Student Characteristics					
Daily mean download, pre	153.75	153.96	153.12	153.36	0.999
	(180.83)	(177.29)	(174.63)	(183.42)	
Average daily use in minutes, predicted, pre	185.26	188.04	188.17	184.60	0.862
	(161.91)	(164.42)	(164.60)	(160.53)	
Live with mother	0.95	0.96	0.97	0.95	0.085
	(0.21)	(0.19)	(0.18)	(0.21)	
Live with father	0.62	0.62	0.61	0.62	0.931
	(0.49)	(0.49)	(0.49)	(0.49)	
Live with Brother/Sister	0.76	0.78	0.78	0.75	0.112
	(0.43)	(0.42)	(0.41)	(0.43)	
Live with Grandfather/Grandmother	0.16	0.15	0.15	0.15	0.766
	(0.37)	(0.36)	(0.36)	(0.35)	
Female	0.42	0.42	0.42	0.45	0.361
	(0.49)	(0.49)	(0.49)	(0.50)	
Number of siblings	1.69	1.73	1.73	1.74	0.625
	(1.25)	(1.30)	(1.31)	(1.28)	
Panel B: Guardian Characteristics					
Guardian Age	40.29	40.64	40.49	40.50	0.587
	(7.82)	(7.98)	(7.92)	(7.67)	
What is your education level?					
Elementary incomplete	0.09	0.10	0.10	0.10	0.961
	(0.29)	(0.30)	(0.30)	(0.30)	
Elementary complete	0.13	0.14	0.14	0.15	0.773
	(0.34)	(0.35)	(0.35)	(0.35)	
Secondary incomplete	0.16	0.15	0.15	0.15	0.691
	(0.37)	(0.36)	(0.36)	(0.36)	
Secondary complete	0.47	0.47	0.47	0.47	0.994
	(0.50)	(0.50)	(0.50)	(0.50)	
High incomplete	0.04	0.04	0.05	0.04	0.329
	(0.19)	(0.21)	(0.22)	(0.20)	
High complete	0.10	0.09	0.09	0.09	0.727
	(0.30)	(0.29)	(0.28)	(0.29)	
What is your current employment status?					
Working full time	0.33	0.33	0.34	0.32	0.707
	(0.47)	(0.47)	(0.47)	(0.47)	
Working part-time	0.13	0.14	0.13	0.13	0.758
	(0.33)	(0.34)	(0.33)	(0.34)	
Not working looking for a job	0.05	0.05	0.06	0.06	0.570
	(0.22)	(0.22)	(0.23)	(0.24)	
Not working not looking for a job	0.47	0.46	0.46	0.47	0.790
	(0.50)	(0.50)	(0.50)	(0.50)	
Other	0.02	0.02	0.02	0.02	0.575
	(0.14)	(0.15)	(0.14)	(0.13)	

Note: This table presents estimated differences between students in the different experimental groups. Columns 1 to 4 present means and stadard deviations in parentheses. Column 5 presents the p-value of a of joint test for differences between the T1, T2 and T3 and SMS-only groups.

Table 4: Take-up: using Administrative Data

	(1) SMS ISP	(2) SMS ISP	(3) SMS W8	(4) SMS W8	(5) W8 installed	(6) W8 installed
			Panel A: T1, T2, T3			
T_1	0.821***	0.820***	0.000	-0.000	-0.001	-0.000
	(0.006)	(0.006)	(0.005)	(0.005)	(0.008)	(0.008)
T_2	-0.000	-0.001	0.832***	0.832***	0.135***	0.135***
	(0.006)	(0.006)	(0.005)	(0.005)	(0.008)	(0.008)
T_3	0.816***	0.816***	0.815***	0.815***	0.156***	0.157***
	(0.006)	(0.006)	(0.005)	(0.006)	(0.008)	(0.008)
Observations	7,707	7,707	7,707	7,707	7,707	7,707
Control Mean	0	0	0	0	0	0
BL Controls		X		X		X
			Panel B: ISP Info and Parental Controls			
ISP Information	0.818***	0.818***	-0.008**	-0.008**	0.011*	0.011*
	(0.004)	(0.004)	(0.004)	(0.004)	(0.006)	(0.006)
Parental Controls	-0.002	-0.003	0.824***	0.823***	0.146***	0.146***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.006)	(0.006)
Observations	7,707	7,707	7,707	7,707	7,707	7,707
Control Mean	0	0	0	0	0	0
BL Controls		X		X		X

Note: This table presents estimated effects on take-up for different treatment groups with respect to the control group. Columns 1 and 2 present estimates on the reception of SMSs including ISP information. Columns 3 and 4 present estimates on the reception of SMSs including an offer of help to install parental control settings. Columnd 5 and 6 present estimates on the installation of parental control settings through the call center of the experiment. Odd-numbered columns present estimates without controls and even-numbered columns present estimates including baseline control variables. Control variables include the baseline values of mean of MBs of Internet use; guardian gender, age, education level and employment status; number of siblings; and dummies for family composition (indicating whether the child lives with mother, father, step-mother or father's partner, step-father or mother's partner, uncle/aunt, brother/sister, grandfather/grandmother, other relatives, and other non-relatives). Robust estimated standard errors are reported in parentheses. *** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level.

Table 5: Take-up: using Survey Data

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Have you ever received an SMS in your Phone from YEMPC program?	Do you remember what the SMS said?	What are you using the information in the SMS for? (cond. on receiving) Discuss with your child	Be informed about the family internet use	Get informed about tools that can be helpful to monitor	Be reminded to ensure a good use of the computer	Have you ever installed parental control software	Guardian's internet use (daily hours)
				Panel A: T1, T2, T3				
T_1	0.013	0.109***	0.267***	0.073***	-0.011	-0.327***	0.025**	0.054
	(0.015)	(0.020)	(0.022)	(0.016)	(0.017)	(0.023)	(0.012)	(0.045)
T_2	-0.030*	-0.161***	-0.019	-0.029*	0.075***	-0.209***	0.094***	0.017
	(0.016)	(0.020)	(0.022)	(0.017)	(0.017)	(0.023)	(0.013)	(0.045)
T_3	-0.019	0.053***	0.220***	0.054***	0.029*	-0.286***	0.109***	0.067
	(0.016)	(0.020)	(0.022)	(0.017)	(0.017)	(0.023)	(0.012)	(0.045)
Observations	3,959	3,363	3,275	3,275	3,275	3,275	3,849	3,327
Control Mean	0.864	0.761	0.196	0.104	0.110	0.587	0.0258	0.542
				Panel B: ISP Info and Parental Controls				
ISP Information	0.012	0.160***	0.253***	0.078***	-0.028**	-0.206***	0.020**	0.052
	(0.011)	(0.014)	(0.016)	(0.012)	(0.012)	(0.016)	(0.009)	(0.032)
Parental Controls	-0.031***	-0.108***	-0.033**	-0.024**	0.057***	-0.081***	0.089***	0.015
	(0.011)	(0.014)	(0.016)	(0.012)	(0.012)	(0.016)	(0.009)	(0.032)
Observations	3,959	3,363	3,275	3,275	3,275	3,275	3,849	3,327
Control Mean	0.864	0.761	0.196	0.104	0.110	0.587	0.0258	0.542

Note: This table presents estimated effects on take-up for different treatment groups with respect to the control group. Robust estimated standard errors are reported in parentheses. *** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level.

Table 6: Impact of Treatments on Intensity of Internet Use

	(1)	(2)	(3)	(4)	(5)	(6)
Period:	All	All	Weekdays	Weekdays	Weekend	Weekend
			Panel A: T1, T2, T3			
T_1	-12.422	-13.178*	-11.154	-11.982*	-15.658*	-16.230**
	(7.978)	(7.086)	(8.115)	(7.215)	(8.279)	(7.471)
T_2	0.058	-0.578	1.281	0.569	-3.062	-3.504
	(8.218)	(7.512)	(8.232)	(7.562)	(8.800)	(8.060)
T_3	-9.594	-11.744	-9.865	-12.143*	-8.902	-10.723
	(7.782)	(7.148)	(7.785)	(7.168)	(8.450)	(7.824)
Observations	7,707	7,707	7,707	7,707	7,707	7,707
Control Mean	168.9	168.9	169.4	169.4	167.6	167.6
BL Controls		X		X		X
			Panel B: ISP Information and Parental Control			
ISP Information	-11.038**	-12.172**	-11.150**	-12.348**	-10.751*	-11.724**
	(5.439)	(4.848)	(5.498)	(4.893)	(5.716)	(5.200)
Parental Controls	1.443	0.429	1.285	0.204	1.844	1.001
	(5.469)	(4.855)	(5.527)	(4.906)	(5.748)	(5.191)
Observations	7,707	7,707	7,707	7,707	7,707	7,707
Control Mean	168.9	168.9	169.4	169.4	167.6	167.6
BL Controls		X		X		X

Note: This table presents estimated effects on Internet use measured as daily average MBs uploaded and downloaded. Odd-numbered columns present estimates without controls and even-numbered columns present estimates including baseline control variables. Control variables include the baseline values of mean of MBs of Internet use; guardian gender, age, education level and employment status; number of siblings; and dummies for family composition (indicating whether the child lives with mother, father, step-mother or father's partner, step-father or mother's partner, uncle/aunt, brother/sister, grandfather/grandmother, other relatives, and other non-relatives). Robust estimated standard errors are reported in parentheses. *** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level.

Table 7: Impact of Random on Intensity of Internet Use

	(1)	(2)	(3)	(4)	(5)	(6)
Period:	All	All	Weekdays	Weekdays	Weekend	Weekend
Random	-14.530***	-12.401**	-15.294***	-13.123***	-12.582**	-10.557**
	(5.458)	(4.873)	(5.516)	(4.921)	(5.735)	(5.216)
Observations	7,707	7,707	7,707	7,707	7,707	7,707
BL Controls		X		X		X

Note: This table presents estimated effects of the random sub-treatment (with respect to the fixed sub-treatment group) on Internet use measured as daily average MBs uploaded and downloaded. Odd-numbered columns present estimates without controls and even-numbered columns present estimates including baseline control variables. Control variables include the baseline values of mean of MBs of Internet use; guardian gender, age, education level and employment status; number of siblings; and dummies for family composition (indicating whether the child lives with mother, father, step-mother or father's partner, step-father or mother's partner, uncle/aunt, brother/sister, grandfather/grandmother, other relatives, and other non-relatives). Robust estimated standard errors are reported in parentheses. *** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level.

Table 8: Impact of Treatments on Intensity of Internet Use Across Periods

	(1)	(2)	(3)	(4)	(5)	(6)
Period:	All	All	Weekdays	Weekdays	Weekend	Weekend
			Panel A: 1st Half of Treatment			
ISP Information	-11.096**	-12.286***	-9.724*	-10.957**	-14.822***	-15.894***
	(4.947)	(4.386)	(5.016)	(4.447)	(5.335)	(4.853)
Parental Controls	4.594	3.667	4.110	3.101	5.908	5.202
	(4.974)	(4.405)	(5.044)	(4.470)	(5.357)	(4.865)
Observations	7,707	7,707	7,707	7,707	7,707	7,707
Control Mean	163.8	163.8	166.2	166.2	157.3	157.3
BL Controls		X		X		X
			Panel B: 2nd Half of Treatment			
ISP Information	-10.978	-12.055*	-12.655*	-13.816**	-6.952	-7.831
	(6.912)	(6.375)	(7.057)	(6.505)	(7.287)	(6.827)
Parental Controls	-1.771	-2.873	-1.696	-2.854	-1.949	-2.920
	(6.946)	(6.383)	(7.091)	(6.523)	(7.326)	(6.819)
Observations	7,707	7,707	7,707	7,707	7,707	7,707
Control Mean	174	174	172.7	172.7	177.1	177.1
BL Controls		X		X		X
			Panel C: Post-Treatment			
ISP Information	-11.273**	-12.126***	-11.101**	-12.007***	-11.710**	-12.428**
	(4.905)	(4.452)	(4.847)	(4.383)	(5.400)	(4.999)
Parental Controls	0.032	-0.717	-0.621	-1.436	1.694	1.112
	(4.921)	(4.455)	(4.863)	(4.387)	(5.418)	(5.002)
Observations	7,707	7,707	7,707	7,707	7,707	7,707
Control Mean	149.5	149.5	147.2	147.2	155.3	155.3
BL Controls		X		X		X

Note: This table presents estimated effects on Internet use measured as daily average MBs uploaded and downloaded. Odd-numbered columns present estimates without controls and even-numbered columns present estimates including baseline control variables. Control variables include the baseline values of mean of MBs of Internet use; guardian gender, age, education level and employment status; number of siblings; and dummies for family composition (indicating whether the child lives with mother, father, step-mother or father's partner, step-father or mother's partner, uncle/aunt, brother/sister, grandfather/grandmother, other relatives, and other non-relatives). Robust estimated standard errors are reported in parentheses. *** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level.

Table 9: Interactions of Treatments with Random

	(1)	(2)	(3)	(4)	(5)	(6)
Period:	All	All	Weekdays	Weekdays	Weekend	Weekend
ISP Info	-12.256	-15.980**	-11.470	-15.291**	-14.263*	-17.739**
	(8.266)	(7.286)	(8.472)	(7.442)	(8.369)	(7.588)
PC	-7.149	-5.672	-7.584	-6.117	-6.039	-4.536
	(8.279)	(7.278)	(8.488)	(7.444)	(8.376)	(7.554)
Random	-24.341**	-22.340**	-24.484**	-22.419**	-23.976**	-22.140**
	(10.114)	(9.293)	(10.141)	(9.367)	(10.893)	(10.023)
ISP Info × Random	2.428	7.608	0.631	5.878	7.014	12.020
	(10.911)	(9.677)	(11.030)	(9.773)	(11.460)	(10.373)
PC × Random	17.193	12.259	17.749	12.701	15.775	11.133
	(10.908)	(9.613)	(11.028)	(9.709)	(11.456)	(10.312)
Observations	7,707	7,707	7,707	7,707	7,707	7,707
BL Controls		X		X		X

Note: This table presents estimated effects on Internet use measured as daily average MBs uploaded and downloaded. Odd-numbered columns present estimates without controls and even-numbered columns present estimates including baseline control variables. Control variables include the baseline values of mean of MBs of Internet use; guardian gender, age, education level and employment status; number of siblings; and dummies for family composition (indicating whether the child lives with mother, father, step-mother or father's partner, step-father or mother's partner, uncle/aunt, brother/sister, grandfather/grandmother, other relatives, and other non-relatives). Robust estimated standard errors are reported in parentheses. *** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level.

Figure 1: Timeline

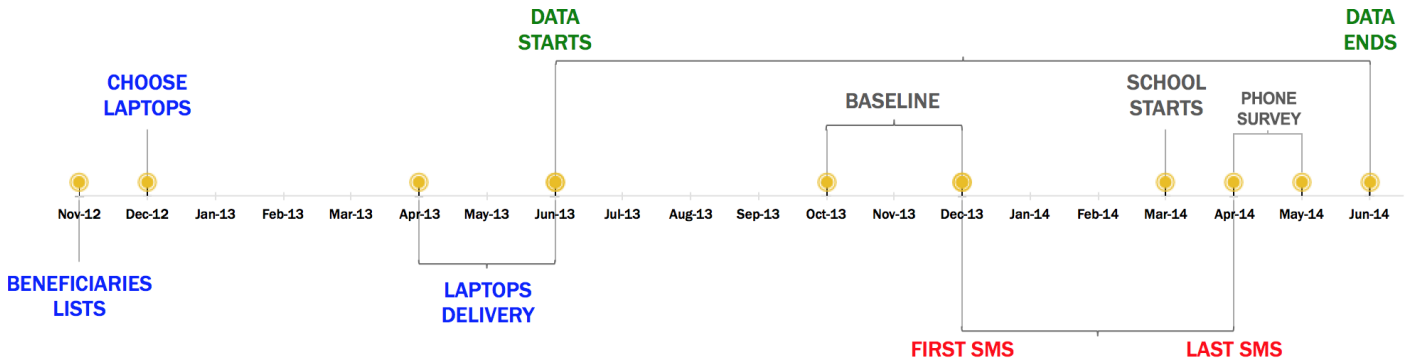
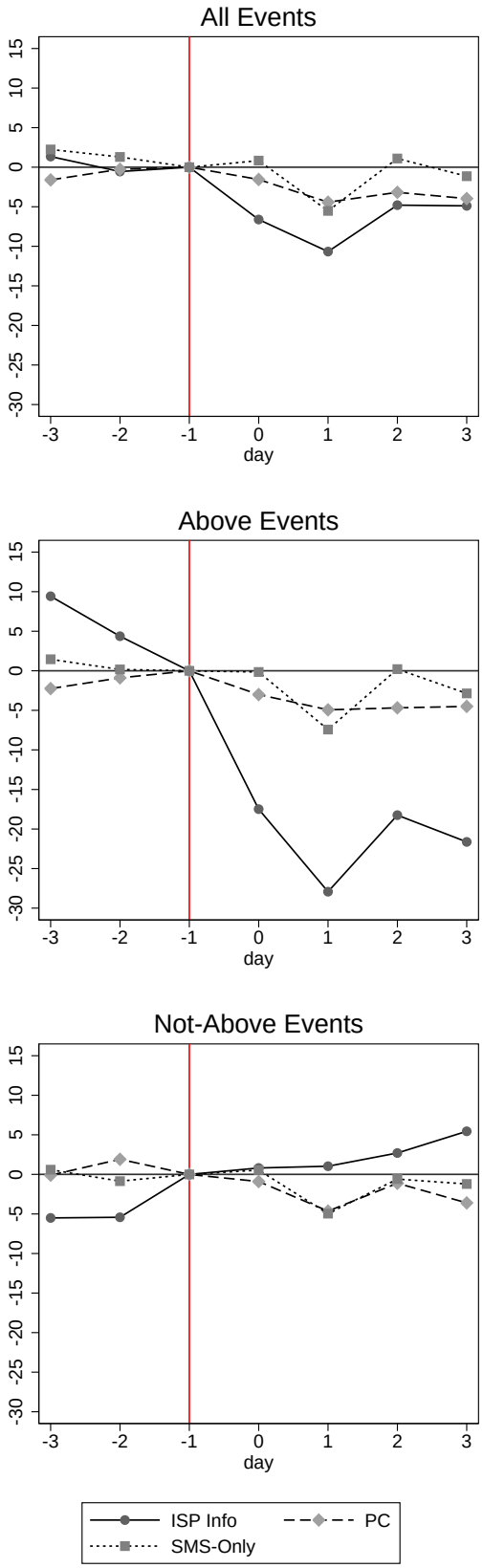
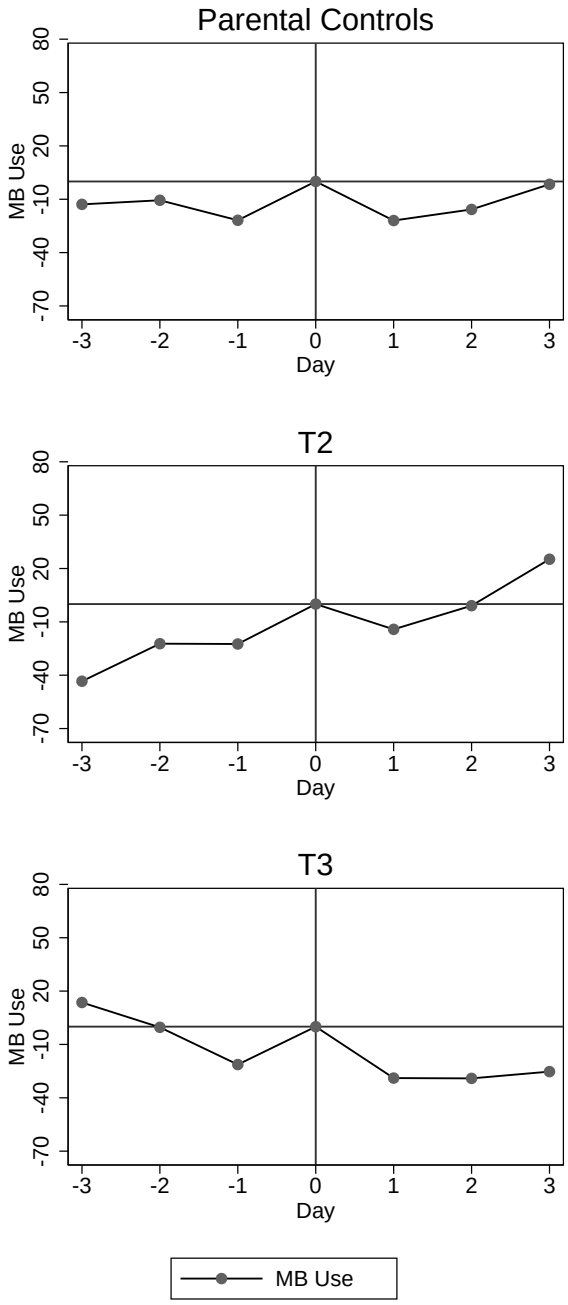


Figure 2: Event Study



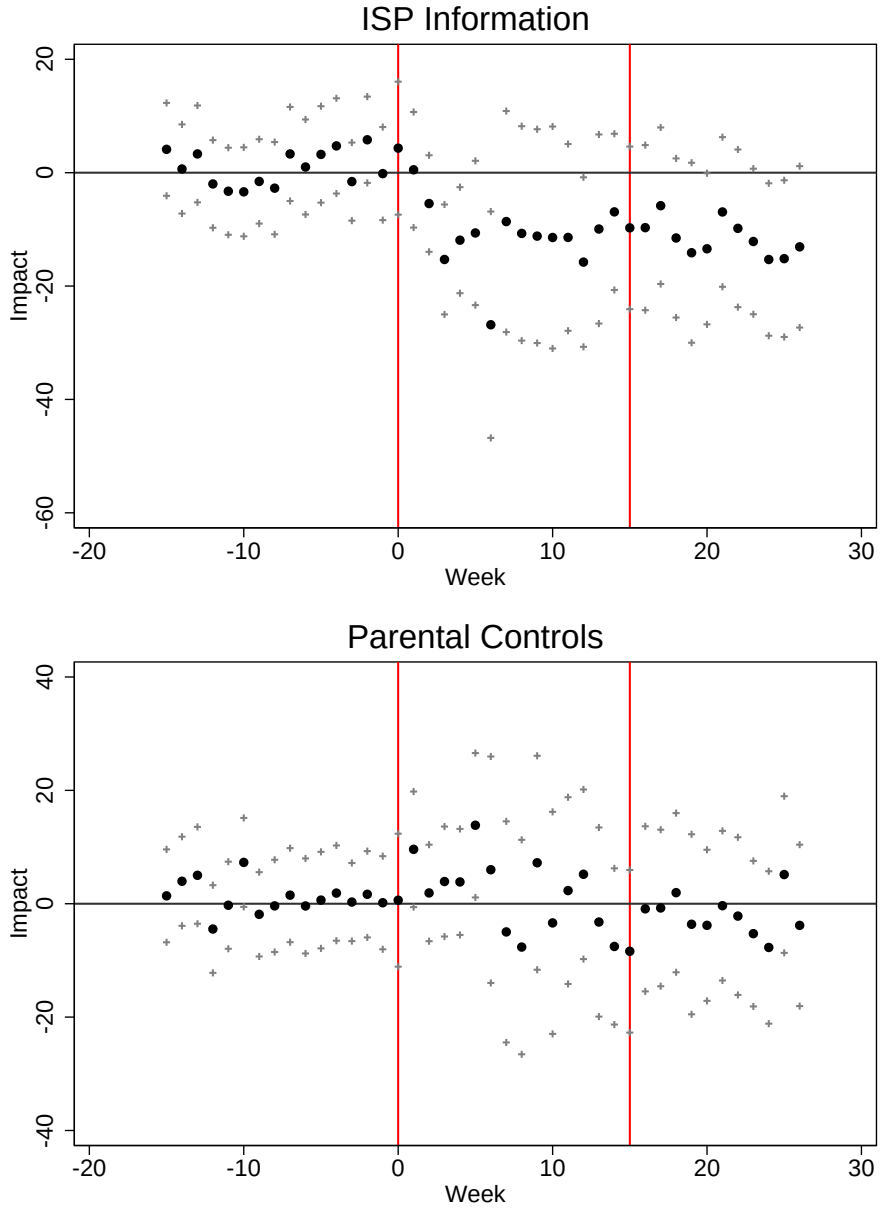
Notes: This figure presents estimated effects for each treatment group in day around the reception of an SMS message. Day 0 marks the day on which the SMSs are received each week. See Appendix Table 6 for more details.

Figure 3: W8 Install Event Study, controlling for seasonality



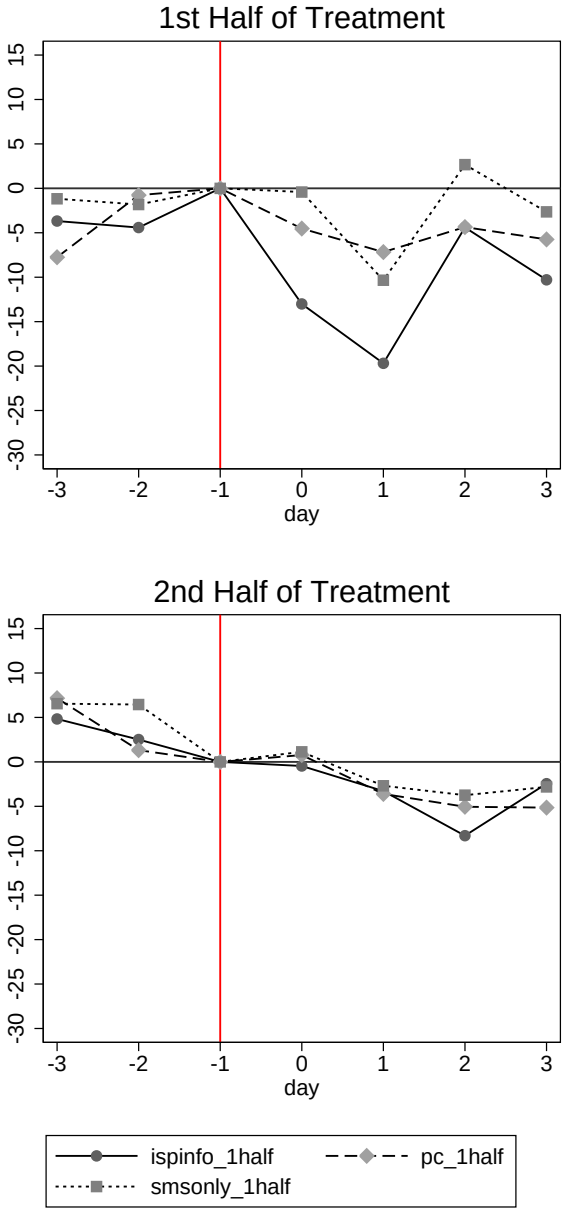
Notes: This figure presents estimated effects for the installation of the W8 parental control settings on Internet use, measured using MBs downloaded and uploaded. Day 0 marks the day on which the program was installed. See Appendix Table 7 for more details.

Figure 4: Impact on MB Use Across Weeks, with controls



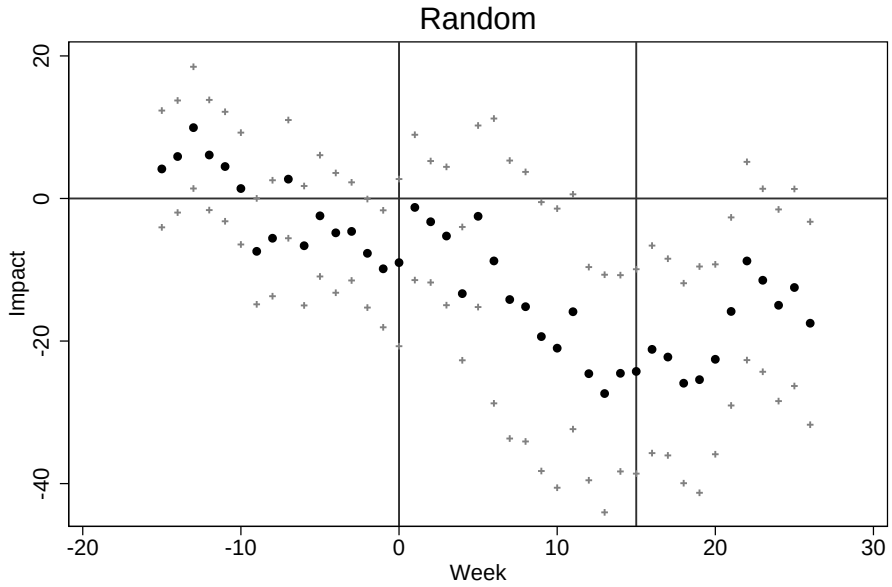
Notes: This figure presents estimated effects (and confidence intervals) for each treatment group (with respect to the control group) for each week of the experiment on Internet use measured as daily average Control variables include the baseline values of mean of MBs of Internet use; guardian gender, age, education level and employment status; number of siblings; and dummies for family composition (indicating whether the child lives with mother, father, step-mother or father's partner, step-father or mother's partner, uncle/aunt, brother/sister, grandfather/grandmother, other relatives, and other non-relatives).

Figure 5: Event Study dividing treatment period in two



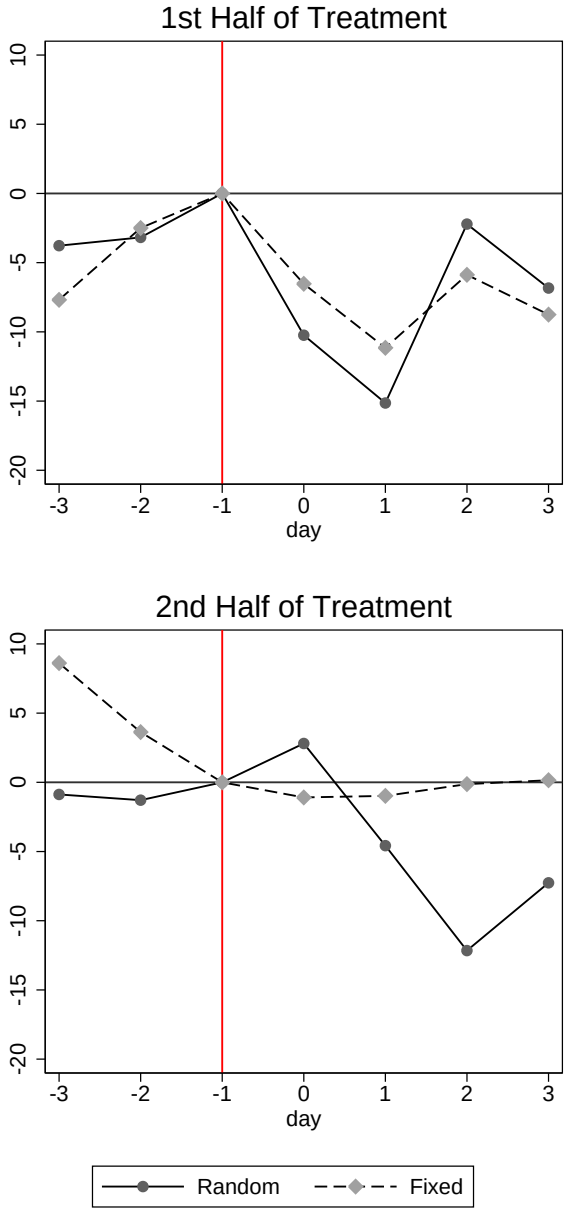
Notes: This figure presents estimated effects for each treatment group in day around the reception of an SMS message, separating the treatment period in two. Day 0 marks the day on which the SMSs are received each week. See Appendix Table 6 for more details.

Figure 6: Impact of Random on MB Use Across Weeks, with controls



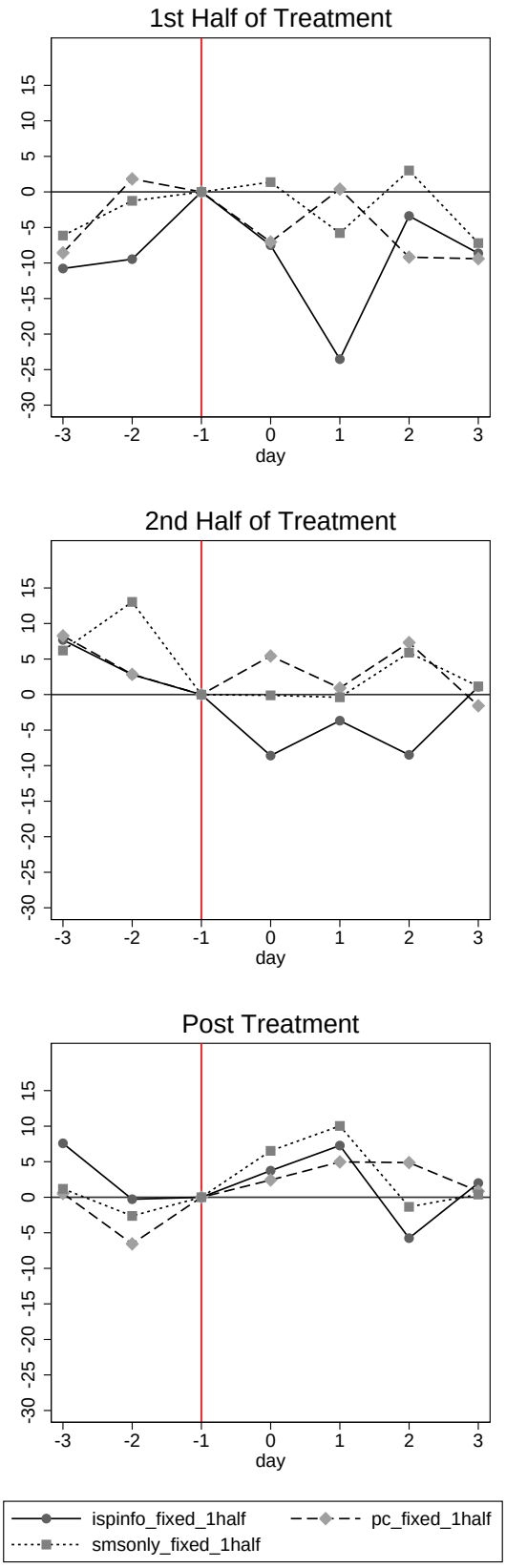
Notes: This figure presents estimated effects (and confidence intervals) for Random sub-group (with respect to Fixed sub-group) for each week of the experiment on Internet use measured as daily average Control variables include the baseline values of mean of MBs of Internet use; guardian gender, age, education level and employment status; number of siblings; and dummies for family composition (indicating whether the child lives with mother, father, step-mother or father's partner, step-father or mother's partner, uncle/aunt, brother/sister, grandfather/grandmother, other relatives, and other non-relatives).

Figure 7: Event Study dividing treatment period in two for Random vs Fixed



Notes: This figure presents estimated effects for Random and Fixed sub-groups in day around the reception of an SMS message, separating the treatment period in two. Day 0 marks the day on which the SMSs are received each week. See Appendix Table 13 for more details.

Figure 8: Event Study, Post-Treatment for Fixed Subgroup



Notes: This figure presents estimated effects for each treatment group restricting the sample to the Fixed sub-group in day around the reception of an SMS message. Day 0 marks the day on which the SMSs are received each week. See Appendix Table 11 for more details.

Table A1: Sample Comparisons

Sample:	Full	Experiment	Survey
Panel A: Student Characteristics			
Daily mean download, pre	157.49	153.55	155.18
	(183.55)	(179.04)	(185.56)
Average daily use in minutes, predicted, pre	189.51	186.52	185.67
	(164.21)	(162.85)	(162.49)
Female	0.41	0.43	0.43
	(0.49)	(0.49)	(0.49)
ADHD	14.21	14.48	14.52
	(3.94)	(4.14)	(4.20)
Number of siblings	1.77	1.72	1.69
	(1.32)	(1.28)	(1.26)
Rural School	0.15	0.15	0.14
	(0.36)	(0.35)	(0.35)
Computer Skills	8.69	8.72	8.75
	(2.06)	(2.02)	(2.00)
Panel B: Mother Characteristics			
Mother's Education Level			
Elementary incomplete	0.12	0.10	0.10
	(0.32)	(0.30)	(0.29)
Elementary complete	0.14	0.14	0.14
	(0.35)	(0.34)	(0.34)
Secondary incomplete	0.16	0.15	0.15
	(0.36)	(0.36)	(0.36)
Secondary complete	0.45	0.47	0.48
	(0.50)	(0.50)	(0.50)
High incomplete	0.03	0.04	0.04
	(0.18)	(0.19)	(0.19)
High complete	0.06	0.06	0.06
	(0.23)	(0.23)	(0.24)
Mother's Employment Status			
Employed	0.34	0.32	0.30
	(0.47)	(0.47)	(0.46)
Unemployed	0.04	0.04	0.04
	(0.21)	(0.20)	(0.20)
Home-maker	0.58	0.61	0.63
	(0.49)	(0.49)	(0.48)
Retired	0.00	0.00	0.00
	(0.07)	(0.06)	(0.07)
Panel C: Household Characteristics			
Rules Index	4.02	4.06	4.08
	(1.11)	(1.08)	(1.07)
Student has Computer at Home	0.40	0.41	0.42
	(0.49)	(0.49)	(0.49)
Student has Internet at Home	0.24	0.25	0.25
	(0.43)	(0.43)	(0.43)
Sample Size	29833	7707	5001

Note: This table presents estimated means for students in the YEMPC program who applied for a computer with Internet connection (Column 1), students in the experimental sample (Column 2), and students in the sample of the phone survey (Column 3). Estimated standard deviations are reported in parentheses.

Table A2: Balance by Treatment

	(1) Random	(2) Fixed	(3) P-Value
Panel A: Student Characteristics			
Daily mean download, pre	153.47	153.54	0.970
	(177.62)	(181.21)	
Average daily use in minutes, predicted, pre	186.12	186.54	0.832
	(162.75)	(162.87)	
Live with mother	0.96	0.96	0.497
	(0.20)	(0.19)	
Live with father	0.61	0.62	0.113
	(0.49)	(0.48)	
Live with Brother/Sister	0.76	0.77	0.296
	(0.43)	(0.42)	
Live with Grandfather/Grandmother	0.15	0.15	0.444
	(0.36)	(0.36)	
Female	0.43	0.42	0.757
	(0.49)	(0.49)	
Number of siblings	1.71	1.72	0.519
	(1.28)	(1.27)	
Panel B: Parents Characteristics			
Guardian Age	40.58	40.30	0.262
	(8.15)	(7.52)	
What is your education level?			
Elementary incomplete	0.10	0.10	0.443
	(0.30)	(0.30)	
Elementary complete	0.14	0.14	0.866
	(0.35)	(0.35)	
Secondary incomplete	0.15	0.16	0.525
	(0.36)	(0.36)	
Secondary complete	0.47	0.47	0.990
	(0.50)	(0.50)	
High incomplete	0.04	0.05	0.072
	(0.19)	(0.21)	
High complete	0.10	0.09	0.162
	(0.30)	(0.29)	
What is your current employment status?			
Working full time	0.33	0.32	0.374
	(0.47)	(0.47)	
Working part-time	0.13	0.13	0.342
	(0.33)	(0.34)	
Not working looking for a job	0.06	0.06	0.515
	(0.23)	(0.23)	
Not working not looking for a job	0.46	0.48	0.289
	(0.50)	(0.50)	
Other	0.02	0.02	0.049
	(0.15)	(0.13)	

Note: This table presents estimated differences between students in the different experimental groups. Columns 1 and 2 present means and stadard deviations in parentheses. Column 3 presents the p-value of a t-test for differences between the Random day and Fixed day groups.

Table A3: Balance by Treatment for the FU Survey Sample

	(1) T_1	(2) T_2	(3) T_3	(4) SMS-Only	(5) P-Value(F-Test)
Panel A: Student Characteristics					
Daily mean download, pre	149.38	158.72	151.25	163.15	0.305
	(177.19)	(184.23)	(171.92)	(205.38)	
Average daily use in minutes, predicted, pre	180.47	191.39	185.34	187.61	0.505
	(159.27)	(166.27)	(162.66)	(162.93)	
Live with mother	0.96	0.97	0.97	0.95	0.041
	(0.19)	(0.17)	(0.17)	(0.22)	
Live with father	0.65	0.65	0.64	0.62	0.345
	(0.48)	(0.48)	(0.48)	(0.49)	
Live with Brother/Sister	0.77	0.79	0.80	0.74	0.030
	(0.42)	(0.41)	(0.40)	(0.44)	
Live with Grandfather/Grandmother	0.16	0.14	0.14	0.15	0.637
	(0.37)	(0.35)	(0.35)	(0.36)	
Female	0.42	0.42	0.42	0.46	0.205
	(0.49)	(0.49)	(0.49)	(0.50)	
Number of siblings	1.62	1.75	1.74	1.71	0.109
	(1.20)	(1.30)	(1.33)	(1.28)	
Panel B: Guardian Characteristics					
Guardian Age	40.54	40.47	40.54	40.85	0.693
	(7.62)	(7.26)	(7.79)	(7.77)	
What is your education level?					
Elementary incomplete	0.09	0.09	0.10	0.09	0.856
	(0.28)	(0.29)	(0.30)	(0.29)	
Elementary complete	0.12	0.14	0.15	0.16	0.139
	(0.33)	(0.35)	(0.36)	(0.36)	
Secondary incomplete	0.17	0.16	0.14	0.16	0.315
	(0.37)	(0.37)	(0.34)	(0.37)	
Secondary complete	0.49	0.48	0.48	0.46	0.724
	(0.50)	(0.50)	(0.50)	(0.50)	
High incomplete	0.03	0.04	0.04	0.03	0.290
	(0.17)	(0.20)	(0.21)	(0.18)	
High complete	0.11	0.09	0.09	0.09	0.543
	(0.31)	(0.29)	(0.29)	(0.29)	
What is your current employment status?					
Working full time	0.31	0.30	0.31	0.29	0.632
	(0.46)	(0.46)	(0.46)	(0.45)	
Working part-time	0.12	0.14	0.13	0.14	0.510
	(0.33)	(0.34)	(0.33)	(0.35)	
Not working looking for a job	0.05	0.05	0.06	0.05	0.916
	(0.22)	(0.23)	(0.23)	(0.22)	
Not working not looking for a job	0.50	0.49	0.48	0.50	0.809
	(0.50)	(0.50)	(0.50)	(0.50)	
Other	0.02	0.02	0.02	0.01	0.572
	(0.14)	(0.14)	(0.15)	(0.12)	

Note: This table presents estimated differences between students in the different experimental groups who participated in the follow-up telephone survey. Columns 1 to 4 present means and stadard deviations in parentheses. Column 5 presents the p-value of a of joint test for differences between the T1, T2 and T3 and SMS-only groups.

Table A4: Take-up: Extensive Margin using Administrative Data

	(1) SMS ISP	(2) SMS ISP	(3) SMS W8	(4) SMS W8
T_1	0.976***	0.975***	0.000	-0.000
	(0.004)	(0.004)	(0.004)	(0.004)
T_2	0.000	-0.000	0.978***	0.978***
	(0.004)	(0.004)	(0.004)	(0.004)
T_3	0.967***	0.967***	0.967***	0.967***
	(0.004)	(0.004)	(0.004)	(0.004)
Observations	7,707	7,707	7,707	7,707
Control Mean	0	0	0	0
BL Controls		X		X

Note: This table presents estimated effects for different treatment groups with respect to the control group. Columns 1 and 2 present estimates on the reception of at least one SMS including ISP information. Columns 3 and 4 present estimates on the reception of at least one SMS including an offer of help to install parental control settings. Odd-numbered columns present estimates without controls and even-numbered columns present estimates including baseline control variables. Control variables include the baseline values of mean of MBs of Internet use; guardian gender, age, education level and employment status; number of siblings; and dummies for family composition (indicating whether the child lives with mother, father, step-mother or father's partner, step-father or mother's partner, uncle/aunt, brother/sister, grandfather/grandmother, other relatives, and other non-relatives). Robust estimated standard errors are reported in parentheses. *** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level.

Table A5: Impact of Treatments on Time of Internet Use

	(1)	(2)	(3)	(4)	(5)	(6)
Period:	All	All	Weekdays	Weekdays	Weekend	Weekend
			Panel A: T1, T2, T3			
T_1	-7.290*	-7.641**	-7.039*	-7.360**	-7.929**	-8.356**
	(3.770)	(3.388)	(3.750)	(3.373)	(3.976)	(3.599)
T_2	3.227	0.834	3.240	0.879	3.194	0.720
	(3.831)	(3.459)	(3.806)	(3.437)	(4.058)	(3.697)
T_3	-2.563	-5.507	-2.780	-5.688*	-2.011	-5.045
	(3.696)	(3.386)	(3.663)	(3.351)	(3.944)	(3.651)
Observations	7,707	7,707	7,707	7,707	7,707	7,707
Control Mean	145.9	145.9	145.7	145.7	146.6	146.6
BL Controls		X		X		X
			Panel B: ISP Information and Parental Control			
ISP Information	-6.540**	-6.991***	-6.530**	-6.963***	-6.568**	-7.060***
	(2.634)	(2.389)	(2.617)	(2.370)	(2.792)	(2.560)
Parental Controls	3.976	1.484	3.749	1.275	4.555	2.016
	(2.637)	(2.393)	(2.619)	(2.375)	(2.796)	(2.562)
Observations	7,707	7,707	7,707	7,707	7,707	7,707
Control Mean	145.9	145.9	145.7	145.7	146.6	146.6
BL Controls		X		X		X

Note: This table presents estimated effects on Internet use measured as predicted time connected to Internet. Odd-numbered columns present estimates without controls and even-numbered columns present estimates including baseline control variables. Control variables include the baseline values of mean of MBs of Internet use; guardian gender, age, education level and employment status; number of siblings; and dummies for family composition (indicating whether the child lives with mother, father, step-mother or father's partner, step-father or mother's partner, uncle/aunt, brother/sister, grandfather/grandmother, other relatives, and other non-relatives). Robust estimated standard errors are reported in parentheses. *** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level.

Table A6: Event Study of SMS messages by Treatment

	(1) Day -3	(2) Day -2	(3) Day -1	(4) Day 0	(5) Day 1	(6) Day 2	(7) Day 3
Panel A: Treatment effect							
ISP Info	1.347	-0.542	0	-6.613	-10.660**	-4.793	-4.885
	(4.753)	(4.660)	(0)	(4.526)	(4.529)	(4.542)	(4.566)
PC	-1.603	-0.256	0	-1.550	-4.419	-3.175	-3.960
	(4.759)	(4.661)	(0)	(4.522)	(4.526)	(4.539)	(4.564)
SMS-Only	2.243	1.295	0	0.834	-5.519	1.101	-1.135
	(4.691)	(4.596)	(0)	(4.463)	(4.467)	(4.479)	(4.504)
Panel B: Above Events							
ISP Info	9.420	4.375	0	-17.484**	-27.921***	-18.247**	-21.621***
	(8.134)	(7.979)	(0)	(7.757)	(7.764)	(7.783)	(7.823)
PC	-2.243	-0.889	0	-3.002	-4.930	-4.679	-4.502
	(5.847)	(5.727)	(0)	(5.556)	(5.561)	(5.577)	(5.608)
SMS-Only	1.457	0.178	0	-0.148	-7.422	0.215	-2.856
	(5.778)	(5.664)	(0)	(5.503)	(5.507)	(5.522)	(5.552)
Panel C: Not-Above Events							
ISP Info	-5.504	-5.422	0	0.814	1.036	2.702	5.447
	(4.929)	(4.828)	(0)	(4.687)	(4.691)	(4.705)	(4.731)
PC	-0.097	1.911	0	-0.899	-4.638	-1.119	-3.600
	(4.186)	(4.099)	(0)	(3.976)	(3.980)	(3.991)	(4.014)
SMS-Only	0.596	-0.852	0	0.543	-4.954	-0.583	-1.208
	(4.117)	(4.034)	(0)	(3.917)	(3.920)	(3.931)	(3.953)

Note: This table presents estimated effects on Internet use measured as MBs downloaded and uploaded for different days around the reception of a SMS. Day 0 marks the day on which the SMSs are received each week. The coefficient for Day -1 is imposed to be 0 for each treatment group. Regressions also include dummies for each event. Robust estimated standard errors are reported in parentheses. *** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level.

Table A7: W8 Parental Control Settings Installation, Event Study

	(1) Day -3	(2) Day -2	(3) Day -1	(4) Day 1	(5) Day 2	(6) Day 3	(7)
Panel A: Parental Controls							
MB Use	-12.852	-10.555	-21.823	-21.960	-15.711	-1.548	
	(28.384)	(28.375)	(28.367)	(28.362)	(28.372)	(28.382)	
Panel B: T2							
MB Use	-43.390	-22.280	-22.451	-14.188	-0.901	25.217	
	(49.181)	(49.166)	(49.153)	(49.143)	(49.153)	(49.166)	
Panel C: T3							
MB Use	13.607	-0.367	-21.302	-28.914	-29.069	-25.277	
	(31.493)	(31.483)	(31.474)	(31.470)	(31.486)	(31.500)	

Notes: This table presents estimated effects on Internet use measured as MBs downloaded and uploaded for different days around the installation of W8 parental control settings.. Day 0 marks the day on which the program was installed. The coefficient for Day 0 is imposed to be 0 for each treatment group. Regressions also include dummies for weeks in which the installation took place. Robust estimated standard errors are reported in parentheses. *** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level.

Table A8: Event Study for 1st and 2nd Half of Treatment

	(1) Day -3	(2) Day -2	(3) Day -1	(4) Day 0	(5) Day 1	(6) Day 2	(7) Day 3
Panel A: 1st Half							
ISP Info	-3.677	-4.411	0	-13.005**	-19.689***	-4.398	-10.291*
	(6.254)	(6.135)	(0)	(5.808)	(5.849)	(5.902)	(5.939)
PC	-7.752	-0.765	0	-4.521	-7.171	-4.359	-5.746
	(6.262)	(6.055)	(0)	(5.822)	(5.863)	(5.919)	(5.953)
Placebo	-1.173	-1.818	0	-0.415	-10.337*	2.670	-2.645
	(6.186)	(6.059)	(0)	(5.729)	(5.767)	(5.822)	(5.860)
Panel B: 2nd Half							
ISP Info	4.832	2.515	0	-0.461	-3.282	-8.304	-2.453
	(7.598)	(7.354)	(0)	(7.020)	(6.983)	(6.967)	(7.001)
PC	7.169	1.322	0	0.771	-3.606	-5.047	-5.145
	(7.569)	(7.330)	(0)	(6.990)	(6.956)	(6.939)	(6.975)
Placebo	6.551	6.456	0	1.133	-2.687	-3.744	-2.818
	(7.489)	(7.253)	(0)	(6.929)	(6.896)	(6.878)	(6.911)

Note: This table presents estimated effects on Internet use measured as MBs downloaded and uploaded for different days around the reception of a SMS. Day 0 marks the day on which the SMSs are received each week. The coefficient for Day -1 is imposed to be 0 for each treatment group. Regressions also include dummies for each event. Robust estimated standard errors are reported in parentheses. *** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level.

Table A9: Take-up by Subtreatment: using Administrative Data

	(1) SMS ISP	(2) SMS ISP	(3) W8 ISP	(4) W8 ISP	(5) W8 Installed	(6) W8 Installed
Panel A: Within Separate Treatments						
Within T1						
Random	-0.007	-0.006	0.000	0.000	0.000	0.000
	(0.011)	(0.011)	(0.000)	(0.000)	(0.000)	(0.000)
Observations	1,927	1,927	1,927	1,927	1,927	1,927
BL Controls		X		X		X
Within T2						
Random	0.000	0.000	0.002	0.003	0.034**	0.033**
	(0.000)	(0.000)	(0.011)	(0.011)	(0.016)	(0.016)
Observations	1,928	1,928	1,928	1,928	1,928	1,928
BL Controls		X		X		X
Within T3						
Random	-0.025**	-0.027**	-0.023**	-0.024**	0.000	0.002
	(0.011)	(0.011)	(0.011)	(0.011)	(0.017)	(0.017)
Observations	1,924	1,924	1,924	1,924	1,924	1,924
BL Controls		X		X		X
Panel B: Within Joint Treatments						
Within ISP Information						
Random	-0.016**	-0.016**	-0.011	-0.012	0.000	0.000
	(0.008)	(0.008)	(0.014)	(0.014)	(0.009)	(0.009)
Observations	3,851	3,851	3,851	3,851	3,851	3,851
BL Controls		X		X		X
Within Parental Controls						
Random	-0.013	-0.014	-0.010	-0.009	0.017	0.017
	(0.014)	(0.014)	(0.008)	(0.008)	(0.011)	(0.011)
Observations	3,852	3,852	3,852	3,852	3,852	3,852
BL Controls		X		X		X

Note: This table presents estimated effects on take-up for the random-day sub-treatment group with respect to the fixed-day sub-treatment group. Columns 1 and 2 present estimates on the reception of SMSs including ISP information. Columns 3 and 4 present estimates on the reception of SMSs including an offer of help to install parental control settings. Columnd 5 and 6 present estimates on the installation of parental control settings through the call center of the experiment. Odd-numbered columns present estimates without controls and even-numbered columns present estimates including baseline control variables. Control variables include the baseline values of mean of MBs of Internet use; guardian gender, age, education level and employment status; number of siblings; and dummies for family composition (indicating whether the child lives with mother, father, step-mother or father's partner, step-father or mother's partner, uncle/aunt, brother/sister, grandfather/grandmother, other relatives, and other non-relatives). Robust estimated standard errors are reported in parentheses. *** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level.

Table A10: Interactions of Treatments with Random

	(1)	(2)	(3)	(4)	(5)	(6)
Period:	All	All	Week	Week	Weekend	Weekend
T_1	-10.943	-17.147	-9.138	-15.498	-15.549	-21.357*
	(12.714)	(11.061)	(13.154)	(11.433)	(12.553)	(11.187)
T_2	-5.835	-6.839	-5.250	-6.324	-7.326	-8.152
	(12.244)	(11.523)	(12.457)	(11.782)	(12.631)	(11.854)
T_3	-19.407	-21.653*	-19.057	-21.408*	-20.300	-22.279*
	(12.603)	(11.340)	(12.828)	(11.559)	(12.917)	(11.771)
Random	-21.642*	-22.497**	-22.146*	-22.986**	-20.357	-21.250*
	(12.044)	(11.212)	(12.037)	(11.290)	(13.098)	(12.130)
$T_1 \times$ Random	-2.972	7.921	-4.047	7.014	-0.228	10.233
	(15.947)	(14.141)	(16.218)	(14.358)	(16.555)	(14.999)
$T_2 \times$ Random	11.796	12.572	13.072	13.836	8.541	9.348
	(16.419)	(15.057)	(16.455)	(15.154)	(17.568)	(16.165)
$T_3 \times$ Random	19.627	19.867	18.384	18.577	22.797	23.159
	(15.569)	(14.205)	(15.573)	(14.249)	(16.907)	(15.565)
Observations	7,707	7,707	7,707	7,707	7,707	7,707
BL Controls		X		X		X

Note: This table presents estimated effects on Internet use measured as daily average MBs uploaded and downloaded. Odd-numbered columns present estimates without controls and even-numbered columns present estimates including baseline control variables. Control variables include the baseline values of mean of MBs of Internet use; guardian gender, age, education level and employment status; number of siblings; and dummies for family composition (indicating whether the child lives with mother, father, step-mother or father's partner, step-father or mother's partner, uncle/aunt, brother/sister, grandfather/grandmother, other relatives, and other non-relatives). Robust estimated standard errors are reported in parentheses. *** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level.

Table A11: Impact for Fixed Subgroup for 1st Half/2nd Half/After Treatment

	(1) Day -3	(2) Day -2	(3) Day -1	(4) Day 0	(5) Day 1	(6) Day 2	(7) Day 3
Panel A: 1st Half of Treatment							
ISP Info	-10.773	-9.457	0	-7.499	-23.529***	-3.387	-8.632
	(8.307)	(8.253)	(0)	(8.052)	(8.109)	(8.163)	(8.169)
PC	-8.570	1.832	0	-7.039	0.391	-9.177	-9.394
	(8.345)	(8.137)	(0)	(8.141)	(8.200)	(8.257)	(8.262)
SMS-Only	-6.137	-1.255	0	1.381	-5.785	3.008	-7.202
	(8.202)	(8.159)	(0)	(7.962)	(8.017)	(8.070)	(8.074)
Panel B: 2nd Half of Treatment							
ISP Info	7.684	2.810	0	-8.582	-3.671	-8.477	1.099
	(10.650)	(10.495)	(0)	(10.348)	(10.289)	(10.233)	(10.232)
PC	8.267	2.850	0	5.434	0.924	7.317	-1.573
	(10.620)	(10.465)	(0)	(10.315)	(10.264)	(10.208)	(10.206)
SMS-Only	6.203	13.041	0	-0.109	-0.379	5.897	1.154
	(10.479)	(10.320)	(0)	(10.180)	(10.128)	(10.075)	(10.071)
Panel C: After Treatment							
ISP Info	7.589	-0.275	0	3.744	7.274	-5.752	1.996
	(6.122)	(6.073)	(0)	(6.052)	(6.055)	(6.064)	(6.018)
PC	0.542	-6.553	0	2.427	4.968	4.880	0.848
	(6.124)	(6.074)	(0)	(6.053)	(6.055)	(6.065)	(6.018)
SMS-Only	1.187	-2.627	0	6.528	10.034*	-1.346	0.384
	(6.009)	(5.971)	(0)	(5.949)	(5.953)	(5.962)	(5.911)

Note: This table presents estimated effects on Internet use measured as MBs downloaded and uploaded for different days around the reception of a SMS. Day 0 marks the day on which the SMSs are received each week. The coefficient for Day -1 is imposed to be 0 for each treatment group. Regressions also include dummies for each event. Robust estimated standard errors are reported in parentheses. *** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level.

Table A12: Impact of Treatments on Intensity of Internet Use, Pre/Post School

	(1) Pre-School	(2) Post-School
	Panel A: T1, T2, T3	
T_1	-12.992	-22.580**
	(12.056)	(9.927)
T_2	1.017	-8.536
	(12.889)	(10.766)
T_3	-12.551	-10.991
	(12.220)	(10.532)
Observations	7,707	7,707
BL Controls	X	X
Control Mean	204.9	153.7
	Panel B: ISP Information and Parental Control	
ISP Information	-13.280	-12.514*
	(8.429)	(6.755)
Parental Controls	0.729	1.527
	(8.489)	(6.787)
Observations	7,707	7,707
BL Controls	X	X
Control Mean	204.9	153.7

Note: :This table presents estimated effects on Internet use measured as daily average MBs uploaded and downloaded. Column 1 presents estimates for the last two weeks of the vacation period and Column 2 for the first two weeks of the school period. Control variables include the baseline values of mean of MBs of Internet use; guardian gender, age, education level and employment status; number of siblings; and dummies for family composition (indicating whether the child lives with mother, father, step-mother or father's partner, step-father or mother's partner, uncle/aunt, brother/sister, grandfather/grandmother, other relatives, and other non-relatives). Robust estimated standard errors are reported in parentheses. *** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level.

Table A13: Event Study for Random for 1st and 2nd Half of Treatment

	(1) Day -3	(2) Day -2	(3) Day -1	(4) Day 0	(5) Day 1	(6) Day 2	(7) Day 3
Panel A: 1st Half							
Random	-3.773	-3.174	0	-10.240**	-15.138***	-2.211	-6.834
	(5.534)	(5.260)	(0)	(4.849)	(4.882)	(4.940)	(4.996)
Fixed	-7.687	-2.496	0	-6.527	-11.153**	-5.877	-8.751*
	(4.804)	(4.717)	(0)	(4.660)	(4.695)	(4.728)	(4.731)
Panel B: 2nd Half							
Random	-0.876	-1.287	0	2.807	-4.576	-12.158**	-7.260
	(6.774)	(6.378)	(0)	(5.869)	(5.843)	(5.846)	(5.903)
Fixed	8.614	3.630	0	-1.093	-0.977	-0.128	0.153
	(5.775)	(5.690)	(0)	(5.610)	(5.582)	(5.553)	(5.553)