Northwestern | INSTITUTE FOR POLICY RESEARCH

Working Paper Series

WP-20-19

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

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Version: May 20, 2020

ABSTRACT

This paper explores the role of parental information and control on children's internet use in Chile. The researchers designed and implemented a randomized experiment whereby 7700 parents were sent weekly SMSs messages that (i) provided specific information about their children's internet use, and/or (ii) offered assistance with the installation of parental control software. They find that providing parents with specific information changes parenting behavior and reduces children's internet use by 6–10%. Evidence from heterogeneity analysis and machine learning algorithms suggest that this information substitutes for the presence of parents at home and complements parents' capacity to be involved in their children's lives. The authors do not find significant impacts from helping parents directly control their children's internet access with parental control software. In addition, they find that the strength of the cue associated with receiving a message has a significant impact on internet use.

The authors would like to thank Ramon Rodriguez and his staff at the Ministry of Education for providing the data and technical assistance necessary to conduct this study. They are especially grateful to Jaime Bellolio who collaborated with them on an evaluation of the "Yo Elijo mi PC" program that is the setting of the present study. Cristian Larroulet, Jose Ignacio Cuesta, Antonia Asenjo, Magdalena Bennet, Ana Mendoza, Dario Romero, Sebastian Otero, Diego Cussen, and Alejandro Saenz provided excellent research assistance. They would like to thank Paloma Acevedo, Felipe Barrera-Osorio, Peter Bergman, Samuel Berlinski, Marianne Bertrand, Lucas Coffman, Stefano Dellavigna, Jeanne Lafortune, Claudia Martínez, Philip Oreopoulos, as well as seminar participants at Columbia Teacher's College, IFPRI, the Inter-American Development Bank, NBER Children Meetings, Northwestern University, Princeton University, PUC-Chile, the University of Houston and the University of Virginia for comments and suggestions. The authors would like to thank FONDECYT (Project 1141111), J-PAL, the Columbia-Chile fund, and the Population Research Center, grant # R24 HD051152-05 from the National Institute of Child Health and Human Development for financial support. All errors are their own.

1. Introduction

Economists have long been interested in how parents can influence their children's actions.[1] However, in many situations, parents are unable to monitor their children because they lack information and cannot observe their children's actions.[2] Even with perfect information, parents may not be able to affect their children's actions if they are unwilling to make negative transfers that impose large costs on the child.[3] As a result, parents may wish for the possibility of controlling their children's actions directly. Thus, the first motivation of this paper is to explore how providing parents with additional information and direct controls can change behavior in the context of home internet use. To this end, we designed and implemented a set of randomized interventions whereby we sent parents weekly SMS messages providing specific information about their children's recent internet use and/or offering assistance with installing parental control software.[4]

The impact of providing parents with additional information or tools to directly control their children's actions may also depend on the cues associated with SMS messages.[5] Thus, a second motivation of this paper is to better understand the role of cues in messages more generally. To this end, we also designed our interventions to separate the informational content from the cue associated with the SMS messages. In addition, we attempted to vary the strength or salience of the cues by randomly

[1] Becker (1974, 1981) proposed the "Rotten Kid Theorem" to show that, under certain assumptions, parents can affect their children's actions indirectly through ex-post transfers.
[2] Relatedly, Bergstrom (1989) shows the Rotten Kid theorem does not hold in the presence of asymmetric information. Bursztyn and Coffman (2012) provide evidence for such asymmetric information in Brazil.
[3] Weinberg (2001) and Berry (2015) examine settings in which parents are unable to provide sufficient incentives or unable to commit to rewarding their children for positive outcomes.
[4] There is a large literature examining the impact of providing information to consumers, students, parents, etc. (Alcott and Rogers, 2014; Jensen, 2010; Dizon-Ross, 2016; de Walque and Valente 2018). Moreover, a number of recent papers study the effect of sending SMS messages to parents with information about missed assignments, attendance, and grades *from schools* (Bergman, 2016; Bergman and Chan, 2017; Berlinski et al., 2017; Cunha, et al. 2017, Kraft and Rogers 2015).
[5] Taubinsky (2014) considers cues in a model of inattentive choice. Bordalo, et al. (2017) present a theory in which cues that surprise relative to previous norms affect choice. Alcott and Rogers (2014) explore the role of cues and inattention when consumers are provided information about their electricity use.

assigning whether parents received messages in a more predictable or less predictable fashion. This is related to research in neuroscience suggesting that human responses may be related to the predictability or novelty of the stimuli and to research in psychology on how different schedules of reinforcement affect behavior.[6]

Exploring the role of parents when navigating home technology is especially instructive because informational frictions 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. While the objective of this paper is not to study the effect of our interventions on educational outcomes, previous research indicates that access to home computers and internet have null or negative effects on academic achievement.[7] Moreover, 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. Whether parental characteristics are related to the efficacy of parental supervision remains an open question, and one we explore in this paper.

We focus on a sample of children in 7th and 8th grade who received free home computers and 12 months of free internet 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 used approximately 174MB of internet content daily, which translates to about 3 hours of internet use per day. This is

[6] See Parkin (1997), Berns et al. (2001) and Fenker et al., (2008) on the predictability of stimuli, and the seminal work by Ferster and Skinner (1957) on schedules of reinforcement.
[7] See Malamud and Pop-Eleches (2011), Fairlie and Robinson (2013), Beuermann, et al. (2015), Malamud et al. (2018), and Vigdor, et al. (2014). A recent study by Gonzalez (2017) exploits exogenous variation of internet penetration in Chile and also finds negative impacts of internet use on standardized test scores, especially for low-income families.

similar to recent estimates from a 2015 PISA survey showing that children in Chile spent 195-230 minutes online per day, the highest rate among all the OECD countries surveyed (OECD, 2017). 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 "ISP information" treatment, we sent parents weekly SMS messages with specific information from the ISP about the intensity of internet use 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 the SMS messages, we compare these treatments to a control group in which parents received generic SMSs reminding them that children should make good use of their computers, a message that was included in every treatment. Furthermore, we attempted to vary the strength or salience of the cue in each of our treatment arms by randomly assigning parents to receive the SMSs either on the same day of the week (the "fixed" subgroups) or on a 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 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 or use by other family members. This suggests that our temporary intervention providing information on internet use may have altered the permanent intra-household equilibrium. Indeed, relative to parents in the control group, parents who receive this information are more likely to change their own parenting behavior; some punish their children more, and some report having more calm discussions with their children about internet use. There is also some evidence that parenting styles become less permissive. Furthermore, we find that our informational intervention substitutes for the presence of a parent at home but is complementary to parents' capacity to be involved in their children's lives.

We also show that there are statistically significant reductions in internet use precisely on the days immediately after receiving SMS messages with ISP information, and that this effect is more relevant in the early weeks of the experiment. The decline in internet use is largest for parents who did not think that their children used too much internet at baseline but whose children did have high levels of internet use. Similarly, we find larger impacts of providing ISP information in the upper quantiles of the distribution of internet use, and for children who used their computers frequently for games. This suggests that our effects are driven by reductions among children with excessive internet use. Using machine learning techniques, we corroborate many of these findings and bolster our traditional heterogeneity analysis.

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 children whose parents' received an SMS message offering assistance for installing parental control software compared to those in the control group who only received a generic message. Moreover, among the 15 percent of parents who installed parental control software with our assistance, we do not find changes in internet use on

the days immediately after installing this software. We believe these findings may reflect the considerable obstacles faced by low-income parents in adopting and implementing technological solutions for monitoring and supervising their children's internet use.

Third, we have several results that help us open the "black box" of how messages that contain information can affect behavior. As described above, by sending messages that vary in the amount of information they contain, we show that a message's informational content affects internet use. Our analysis also yields two additional findings that suggest the importance of cues. When we experimentally vary the strength or salience of the cue, we find that households who received SMSs in a more predictable fashion experienced significantly greater reductions in internet use than those who received SMSs in a less prediction fashion, 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 show that providing parents with information about their children's actions can affect behavior, as well as the interactions between parents and children. Second, we examine whether helping parents exercise direct control over their children's actions can affect behavior. Third, we isolate the impact of providing parents with specific information from the effect of a cue associated with receiving a message, and further explore the role of these cues by introducing experimental variation in the predictability of SMS messages.[8] While our data does not enable us to observe what children are specifically doing on the internet,

[8] Similarly, Cunha et al. (2017) compare the effect of providing parents with information about children's behavior with a message that emphasizes the importance of paying attention to children's behavior.

this study provides a unique opportunity to explore the 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 and the experimental design. Section 3 describes the data, the empirical strategy, and the patterns of take-up. Section 4 presents the main findings. Section 5 examines the heterogeneity of our impacts with traditional and machine learning analyses. Section 6 presents further results on how parents update, the persistence and dynamics of our main effects, and interaction effects between the different treatment arms. Finally, Section 7 concludes.

2. Background

2.1 The YEMPC program

We designed and implemented our experiment for the 2013 cohort of the "Yo Elijo mi PC" (YEMPC) program, which 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 the Ficha de Protección Social (FPS), an instrument to measure poverty used to determine eligibility for social programs.

The timeline of the 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. Every student who meets the FPS and GPA requirements is eligible to receive a computer; there is no application process. Students select a computer in November-December. A number of options are available each year,

although all computers were equipped with Windows 8 and Microsoft Office. Computers are distributed to students during the months of April and May. The computers are given out in school, 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 through a private Internet Service Provider (ISP).

Our experiment centers on students who entered 7th grade in 2013 and were selected to the program in November 2012. Figure 1 presents the timeline associated with the 2013 cohort of the YEMPC. We focus on the 32,270 beneficiaries of this cohort who received free internet access with their computers starting in mid-2013 (out of a total of 52,122 beneficiaries). In October and November of 2013, we called parents by phone using contact information from the program's administrative records, asking them to participate in the study and complete a telephone baseline survey. Our final analysis sample consists of 7,707 parents with valid cell phone numbers (which we need to implement our SMS interventions) and who consented to participate in the experiment.[9]

Prior to receiving computers through the YEMPC program, 40% of beneficiaries had a PC at home, 23% had internet access at home, and 6% had a cell phone with internet access.[10] Furthermore, the median student reported only having "access to internet some times in the week". This contrasts with an average of three hours of internet use *per day* at the start of our experiment, when students already had access to the internet through the YEMPC program.

[9] Appendix Table 1 compares the students in our analysis sample with a broader sample of those who received a computer with free internet through the "Yo Elijo Mi PC" program. We do not observe large differences between the analysis sample and the broader sample.
[10] This is based on surveys completed by students when selecting a computer from the YEMPC program.

2.2 Experimental Design

The intervention 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 content, we had three types of SMSs based on the following scripts:

- SMS-only: "We hope your child makes good use of the Yo Elijo Mi PC laptop that he/she won".
- ISP information: "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." [11]
- W8 controls: "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."

Table 1 shows how the 7,707 families were divided into the different experimental groups. 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 SMS messages 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.

We used information from a baseline survey and administrative data on internet use to implement a stratified randomization with 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), and (iii) total MBs

[11] We calculate weekly MBs downloaded by a "typical child" using a separate reference group of 1,929 children who received free internet through the YEMPC program.

downloaded in the pre-treatment period between September and December 15, 2013. The messages were sent weekly between 4pm and 5pm on different days of the week from December 23, 2013 to April 6, 2014. This period covers the summer vacation (from December, 23 2013 to March 6, 2014) and the first month of school (from March 7, 2014 on).

3. Empirical Framework

3.1 Data

The main source of data for our study is the administrative data on internet use for each beneficiary collected by the ISP provider. This includes daily information on MBs downloaded and uploaded. We received this information for each beneficiary from September 22, 2014 to June 17, 2015. Thus, we have information on internet use for the period before the SMS treatments started, during the period in which the SMSs were delivered, and for 12 weeks after the treatment was discontinued. We also administered a baseline survey to parents by phone in October and November of 2013. We use information from the baseline survey to conduct the stratified randomization and to control for several baseline characteristics in our main specifications. These include 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 this information for all the individuals included in the sample, as this was part of the enrollment process into the study.

Table 2 summarizes student and parental characteristics for our main experimental sample. The daily mean of MBs used in the 3 months prior to treatment was approximately 174 MB, which corresponds to 186 minutes of predicted internet use (as described later in this section). Almost all children in our sample live with their

mothers, and over 60 percent also live with their fathers. Moreover, about three-quarters have a sibling living with them and fifteen percent also live with a grandparent. Our sample of students is 43 percent female and have an average of 1.7 siblings. The average age of the guardian is 40 years old. Most guardians have some secondary education, but just 4 percent have some higher education, while the remainder have only an elementary education, which is not surprising given the target population of the YEMPC 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 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. This measure captures the take-up of the W8 treatment directly from us, though parents could also have installed parental control software on their own or by other means.

After the treatment ended, in April and early May of 2014, we applied a brief phone interview to explore the potential mechanisms underlying our estimated impacts. We were able to contact 5,001 parents who consented to participate in this follow-up survey, representing 57% of the original sample.[12] The lower rate is mostly a consequence of the difficulty in reaching parents on the phone; the fraction of parents who refused to answer the survey conditional on picking up the phone was only 14%. The survey includes a series of questions about parent recollections of receiving SMSs,

[12] Appendix Table 1 compares baseline characteristics between the baseline and follow-up samples.

the usefulness of the SMSs, and the decision to install the parental control software, as well questions about parenting styles and parenting behavior.[13]

Note, in order to help interpret our results on MBs used, we constructed a proxy for time spent on the internet using information from students of the 2012 YEMPC cohort. For this earlier cohort, we have information on both MBs used (downloaded and uploaded) and time connected to the internet for a sample of 48,920 students over 125 days (from mid-April to early December, 2012). Using this information, we estimated OLS regressions models with time spent on the internet as a non-linear function (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 the time spent on the internet for our sample. We present these estimates to aid in the interpretation of our main results and use them as robustness checks.

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 at the 10% level for just one variable: whether the child lives with their mother.[14] Moreover, the differences in means 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.

[13] We use an abridged (17-item) version of the Parenting Styles and Dimensions Questionnaire (PSDQ) and the Caregiver-Subject Conflict Scale from the Project on Human Development in Chicago Neighborhoods.

[14] 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 20), and with small differences: the random-schedule households have slightly fewer 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.).

3.2 Empirical Strategy

We consider two alternative approaches for estimating the impact of our main interventions on internet use. First, we compare average internet use across households allocated to the different treatment groups. This allows us to identify the average effect on internet use over the entire treatment period, and beyond. Second, we analyze the effects of the actual receipt of the SMS messages using an event study framework in which we exploit within-event variation in internet use at the daily level. This enables us to better understand the mechanisms behind the changes in behavior.

For 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:

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

where Y_i is a measure of internet use for household i. Our set of control variables (X_i) includes strata fixed effects and internet use in the pre-treatment period; in some specifications, we also include demographic characteristics collected at baseline. The coefficient on T1 captures the effect of receiving ISP information relative to the control group T0, the coefficient on T2 captures the effect of being offered assistance with installing parental controls relative to the control group, and the coefficient on T3 captures the combined effect of receiving ISP information and assistance with installing parental controls relative to the control group. To the extent that not all of the SMSs sent are actually received, the coefficients will estimate intention-to-treat (ITT) parameters. 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 who received an SMS with ISP information , and $ParentalControls_i$ is an indicator for households who received an SMS to help install parental control software. This specification assumes that there are no complementarities between the two separate SMS scripts. As shown 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 believe that the assumption underlying this alternative model generally holds true.[15]

For the second approach, we estimate the effect of each SMS "event" on internet use in 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

[15] See Muralidharan et al. (2019) for further discussions regarding the estimation of a "short" model that excludes interactions vs. a "long" model which includes the cross-cutting interactions.

day dummy variables, and μ_e denotes event fixed effects. This approach allows us to estimate a vector of coefficients that capture differences in internet use with respect to day -1 (the day before the SMS is received) for each treatment group. For instance, θ_{-3} measures the difference in internet use 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 analogous 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-treatment in which we vary whether the SMSs are sent in a more predictable or less predictable 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-treatment which vary whether the SMSs were 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.

3.3 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

with 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 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.[16]

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 15 percent of households in treatment group T2 and 16 percent of households in group T3 received our assistance in installing the W8 parental control software; as expected, these rates were zero in treatment group T1 and the control group.[17] Note that this intervention may have encouraged parents to install parental control software even without our assistance (see results in column 7 of Table 5), in which case our administrative measure of take-up could be understating these effects.

After treatment ended, 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

[16] 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.

[17] 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.

whether parents recalled ever receiving an SMS across the different treatment arms T1, T2 and T3, on 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 ever receiving an SMS). Column (2) indicates that, among parents in groups T1 and T3 who received an SMS regarding the ISP internet use, significantly more remembered what the SMS said compared to the control group. In contrast, among parents in group T2 who only received an SMS regarding W8 parental controls, significantly fewer remembered what the SMS said 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.

Columns (3)-(6) show whether, conditional on reporting the receipt of an SMS, parents found the SMSs useful. Parents in groups T1 and T3 who received SMSs providing ISP information were significantly more likely to find these messages useful for being informed about their children's internet use. Moreover, while approximately 20 percent of parents in the control group discussed the SMSs with their kids, this fraction more than doubles for parents that received information about their children's internet use. 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, although all the treatment arms 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" compared to the control group which contained only this sentence. This present a first indication of limited attention on the part 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. The lower rates of reported installation in our survey data compared to the administrative data suggest that there may, again, be some issues with recall. Yet there is also evidence that some parents in group T1 and the control group installed parental control software despite not receiving any assistance from us, as discussed above. Furthermore, while the estimates are not significant, column (8) suggests that parents may have used more internet 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. However, take-up associated with installing the Windows 8 (W8) parental control software was relatively low.

4. Main Results

This section describes our main results on the respective roles of information, parental controls, and cues for understanding how parental monitoring and supervision affects children's internet use.

4.1 Information

We begin with a discussion of the cumulative 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 receive the ISP information about internet use, had lower intensity of internet use during the treatment period. The daily reduction of 11-16 megabytes (MB) used represents a 6-10 percent decrease relative to the control group. The impacts for households in group T3, in which parents were provided with both information about internet use and help to

install parental controls, are negative but somewhat smaller in magnitude and less significant than those for T1. Panel B yields more precise estimates for the effect of providing ISP information from both T1 and T3, clustered closely around 12 MB, or a 7 percent decrease relatively to the control mean. This translates to a daily reduction of 7 minutes of internet use in households that received the ISP information intervention (see Appendix Table 5 for estimates on predicted minutes of use). These results indicate that providing parents with specific information about their children's internet use leads to a significant reduction in internet use.

For the most part, the impacts of our interventions are 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.

We also explore the high-frequency dynamics of our interventions with 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 controls intervention(PC). Day 0 marks the day on which the SMSs are received each week, although the messages were received in the afternoon so we might expect larger impacts on the following day (day 1). For ease of comparison, we normalize all of the coefficients to equal zero on the day prior to the receipt of the SMS (day -1). These coefficients are also presented in Appendix Table 7 along with their standard errors.

We do not observe a clear trend for any of the groups in the days preceding receipt of the SMS (days -3 to -1). However, significant differences 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 level of internet use in the days before the SMS is received. The plot for the control group does not follow the same pattern. While there is a small decrease on day 1, this quickly reverts to the level of the days before the messages were sent. This confirms that the receipt of the SMS messages themselves leads to a discernible effect on internet use.[18]

The impact associated with the actual content of the message received by the ISP-info group is shown in the bottom two panels 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 (Panel B) and those receiving a message stating that internet use was the "same or below" the mean (Panel C). It is clearly those SMSs which also provide information about internet use relative to others that generate the larger immediate effects on internet use. We do not see a similar pattern for the other two groups, which suggests that this is not explained by mean-reversion in internet use.[19]

To summarize, these results indicate 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 isolate the impact of information from the cue associated with receiving the message itself. Moreover, the evidence from

[18] We suspect that the decrease in internet usage associated with the SMS-only message to "make good use of the computer" is due to the fact that the majority of the parents already thought that their child was using too much internet.

[19] We also verified that a similar pattern is observed when restricting to only the first SMS. Thus, when the first SMS received indicates that internet use is "above" average, there is a significant reduction in internet use in the days immediately after. Interestingly, when the first SMS indicates that internet use is "similar or below" average, there is actually an increase in internet use in the days immediately after.

our event study analysis showing that message content drives the impacts serves to reinforce the fact that it is the information itself which generates the causal impact on internet use.

4.2 Parental Controls

Next, we consider the impact of offering assistance to install 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 offered assistance with the installation of parental control software; 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 around zero. Thus, the cumulative estimates suggest that offering parents assistance to install parental control software is not an effective way of changing behavior. This is also in line with 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 the assistance for 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 during January (after which no more calls were received), which allows us to estimate an event study that controls for the day of the month, similar to those used in estimating the impact of receiving an SMS. The results of this analysis, shown in Figure 3 and Appendix Table 8,

indicate no significant short-term impacts in the days immediately after W8 parental control software is installed. 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 our previous results.

The absence of significant impacts from installing parental control software could indicate that parents already had 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 observed 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 could be helpful in monitoring their children. But perhaps such parents need more hands-on assistance to actually use parental control software on their children's computers.[20] 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).

4.3 Cues

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

[20] 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 girls) and the stated desire to install parental control software from the baseline survey.

First, we use our event study framework to show that SMS messages sent to the control group had short-term impacts in the initial weeks of the experiment. Figure 4 and Appendix Table 9 present the impacts from this event study for each treatment group during the first and second half of the treatment period. We discuss the implications of these patterns for our main interventions in a subsequent section. However, it is notable that there is a negative and statistically significant decrease of about 10 MBs for the control group on the day after SMS messages were received during the first half of the treatment period. This suggests that the salience of the message also matters, since SMS messages without specific information on internet use are likely to be more salient at the beginning of the experiment.

Second, we consider the effect of varying the strength of the cue associated with messages by sending them in a more predictable or less predictable fashion. As explained previously, for each treatment arm, a random subset of households received SMSs on the same day of the week (this fixed day was randomly drawn for households) while the remainder of the sample received SMSs on a random day of the week. Table 7 examines the effect of receiving SMSs on a random versus a fixed schedule. Households who received SMSs on a random schedule had reductions of 10-15 MBs in daily internet use relative to households on fixed schedules. This is similar in magnitude to the main effect associated with receiving ISP information, and suggests that the strength of the cue is as important as the informational content of the message itself.

We believe that these findings are consistent with research in neuroscience and psychology suggesting that unpredictable and novelty stimuli have larger impacts (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 (Karlan, et al. 2014, Taubinsky 2014, Ericsson, 2017). An 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 certain days (and that the impact of repeated messages is non-linear). If this is the case, we would expect to find heterogeneous treatment effects by the day of the week in which the message was delivered. However, we do not find statistically significant differences across days. It is also possible that a random schedule leads parents to believe that the messages are being sent in a discretionary fashion, and with a stronger pejorative element, rather than being sent automatically.

5. Heterogeneity Analysis

This section examines the heterogeneity of impacts associated with the ISP information intervention to shed light on which parental characteristics serve as complements and substitutes to the provision of information about children's internet use. We also use heterogeneity analysis to address the question of whether the reduction in internet use is beneficial and the concern that internet use by other family members might explain our findings. Finally, we implement machine learning techniques to bolster this traditional heterogeneity analysis and to corroborate our findings.

5.1 Parents as Moderators

Panel A of Table 8 presents interactions of our main estimates for the impact of parental information with baseline variables capturing household structure and parental involvement. The largest responses to our ISP information intervention occur in families where internet use is less likely to be observed by parents: the reductions in internet use are larger when the mother is not a "stay-at-home" mom vs. a "stay-at-home" mom (14.5MB vs. 8.5MB) and larger in single parent families vs. non-single

parent families (26.2MB vs. 3.9 MB). This suggests that our informational intervention is most useful when it is difficult to supervise a child during the day.

We also use information from the baseline survey to construct an index of parental involvement and compare households with high vs. low levels of parental involvement.[21] The reductions in Internet use associated with our ISP information intervention are substantially larger (23.1 MB vs 7.8) for parents that are highly involved vs. those less involved. This difference suggests that parental involvement may be an important prerequisite for using the information that we provide effectively. In other words, our informational interventions may serve as a substitute for the presence of a parent at home but are complementary to parental capacity to be involved in their children's lives. Interestingly, we do not observe much difference in the impact of our interventions by mother's education, which suggests that our previous results are not driven by differences in human capital across families.[22]

5.2 Is the reduction of internet use beneficial?

It is important to emphasize that we did not design this study in order to estimate the educational impacts of these interventions (and given the short duration of our interventions, we are not powered to pick up impacts on educational outcomes). Moreover, 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. Indeed, the fact that many parents in our sample perceive their children as having excessive internet use is arguably more important for the interpretation of our

[21] This index is based on three questions asking about the frequency of parental involvement in children's school life (helping them with their studies, communicating with their teachers, reaching out to teachers).
[22] For the most part, the heterogeneous responses in Table 8 for the parental control intervention are not different along the same dimensions of parent characteristics. This is not surprising given the absence of an average treatment effect for this intervention.

findings than whether internet use is actually harmful. That said, we do believe that reductions in internet use are likely to be beneficial in the context of our study.

As mentioned earlier, previous research on the effect of internet use in Chile and in the United States suggests null or negative effects on academic achievement. Furthermore, Panel B of Table 8 shows that the reduction in use associated with the informational interventions is especially large (about 36MB) for those children who used the computer frequently (i.e. daily) for playing games at baseline, but insignificant for children who used the computer frequently (i.e. daily) for homework or used it infrequently at baseline. Using quantile regressions, we also observe variation in treatment impacts for different levels of internet use. The top panel of Figure 5 plots the point estimates for the impact of providing ISP information for different quantiles of the distribution of outcomes (the underlying coefficients are in Appendix Table A6). The effects of providing information are concentrated in children above the median, and the absolute value of these estimates increases almost monotonically from about -12 MBs for quintile 45 to about -64 MBs for quintile 95.

These results suggest that the largest effects of the informational intervention are concentrated among children with high levels of use, and who may have benefitted the most from a reduction in internet use. Furthermore, the large reductions in internet use when parents are more involved in their children's schooling is also consistent with the argument that these reductions are beneficial.

5.3 Do parents and other family members use the internet?

One concern regarding our results so far is that the reductions in internet use could be driven by other members of the family who may also be using the computer. However, we do not believe that the evidence is consistent with this possibility. To

begin with, recall that we did not observe declines in parents' report of their own use (in column 8 of Table 5). In addition, Panel C of Table 8 extends the heterogeneity analysis to consider several factors that could proxy for internet use by other family members.

First, we observe substantially larger declines in internet use when parents report that no one else other than the child uses the YEMPC computer. Second, the reductions of internet use are robust to looking at families in which parents report that there were other computers available at home at baseline and therefore, less likely that other family members would need to use the YEMPC computer). Third, our results are not any smaller (and, if anything, larger) for parents with low digital competence (i.e. those who do not know how to surf the internet or send an email) and therefore less likely to use a computer in any case. To summarize, our findings are not driven by families in which changes in computer and internet use is likely to be explained by the use of other family members.

5.4 Analysis using Machine Learning

We explore the robustness of our heterogeneous treatment effects by following a recent machine learning technique proposed by Chernozhukov et al. (2018). Rather than relying on the standard approach of navigating statistically significant interaction effects, Chernozhukov et al. (2018) generate "proxy predictors" for the conditional average treatment effect (CATE), i.e. the difference in the expected potential outcomes between treatment and control groups conditional on covariates. For our purposes, the covariates include those in Table 8, as described in the preceding subsections.

We begin by verifying the heterogeneous treatment effects of the information intervention (relative to the control group). Panel A of Table 9 presents estimation

results of the Best Linear Predictor (BLP) of the CATE, showing the average treatment effects (ATE) and heterogeneity loading (HET) parameters that determine heterogeneous treatment effects. Confidence intervals in parentheses report the medians of interval sets resulting from 100 sample splits, with the corresponding p-values in brackets. We observe that the estimated ATEs of being assigned to receive SMS messages with information about internet use (□□□_□□□□□□□□□□□□) using the Elastic Net and Random Forest are similar to the unconditional ATE in our main tables. Furthermore, we detect heterogeneity in the treatment effect by rejecting the null hypothesis that HET is zero at the 10% level.

Next, we construct the most and least responsive subgroups when being assigned to our informational intervention. We divide the students into five groups based on the machine learning proxy predictors for the expected potential internet use by covariates, and estimate and compare the average effect for the most and the least affected groups. These sorted Group Average Treatment Effects (GATES), or average treatment effect by heterogeneity groups, are displayed in Panel B of Table 9. Both Elastic Net and Random Forest show that the difference of GATES of these two groups is economically large but not significantly different from zero at the 10% level (Columns 3 and 6).

Finally, in Panel C of Table 9, we examine which of the covariates are correlated with the heterogeneity by comparing the average characteristics of the most and the least affected groups. This is referred to as Classification Analysis (CLAN) in Chernozhukov et al. (2018). We find that households with single parents and those with higher parental involvement index are significantly more likely to respond to the information intervention. We also find that households with a mom at home are more likely to respond to the information intervention, although these differences are not

statistically significant. This analysis confirms our view of parents as moderators, i.e. that the informational interventions substitute for the presence of a parent at home but are complementary to parental capacity to be involved in their children's lives.

Furthermore, children who used the internet more frequently to play games at baseline are over-represented among the group most affected by our informational intervention. This is consistent with the finding that the largest declines in internet use are among those children who are using the internet to excess. On the other hand, we do not find evidence suggesting that the reductions in internet use are driven by other family members. For example, the most and least affected groups are similar in terms of the likelihood that somebody else in the family uses the computer. Furthermore, in some cases, the direction of the effects goes the other way: i.e. the group that reduces internet use the most is more likely to already own a computer and has parents with lower levels of computer skills.

6. Further Results

This section presents additional results to help us better understand the effects and mechanisms associated with our main findings. We examine parents' beliefs regarding their children's internet use and changes in parenting behavior due to the informational intervention. We then explore the persistence and dynamics of our impacts, as well as the interactions between information, parental controls, and cues.

6.1 Parental priors on children's internet use

If, as argued earlier, our results are driven through an informational channel, then one should expect differential responses from parents who had different prior beliefs about their children's internet use at baseline, and when these priors did not

match the realization of actual use. Table 10 distinguishes between four groups of parents along two dimensions: those who had a high (low) perception of their children's internet use at baseline, and those whose children have high (low) levels of actual internet use in the period prior to the start of the interventions.[23] As expected, the largest reduction in internet use is among misinformed parents with low perceptions of their children's internet use at baseline but high actual use. The impacts are also considerably larger for parents who are correct in their prior perception that their children had high levels of internet use.[24]

6.2 Parents as mediators

We use information from the endline survey to observe how parenting behavior may have been affected by the informational interventions. Column (1) of Table 11 indicates that parents who receive information about their children's internet use are 1.7 percentage points more likely (on a base of 7.2%) to report that their children had problems with computer use. Column (2) reveals that parents who receive information are 1.5 percentage points more likely (on a base of 7%) to report punishing their child in response to these problems. At the same time, column (3) shows that some parents are also more likely to report discussing these computer problems with their children in a calm manner. Finally, in column (4), parents who receive ISP information are more likely to report that decisions about internet use are backed by information.

[23] We define parents with high (low) perception as those who say that believe their child uses (not) "too much internet" in the baseline survey; we define parents whose children have high (low) actual use as those who have above (below) average use in the pre-treatment period.
[24] This may reflect the increased confidence (i.e. precision) that parents have in the belief that their children are making excessive use of the internet. These parents are as likely to report that they "remember what the SMS said" and "discuss it with [their] children" as those who had mistaken perceptions that their children had low levels of internet use at baseline.

The last three columns of Table 11 present estimates for the impact on our main interventions on measures of alternative parenting styles (authoritative, authoritarian or permissive) collected in the endline survey. While these results are somewhat noisy, there is some suggestive evidence that parents in the ISP information group are less likely to be classified as having a permissive parenting style. Thus, the results in Table 11 suggest that our informational intervention may have changed the equilibrium level of internet use through increases in punishments, discussions surrounding internet use, and a less permissive parenting style.

6.3 Persistence

To the extent that our informational interventions provided parents with new tools to address the challenge of monitoring and supervising their children, we would expect the main 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 the SMSs. 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").

We consider the broad patterns over time in Figure 6, 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 that treatment effects remain at a similar level even after the interventions conclude in week 14. This indicates that our main impacts did persist following the treatment period. A similar picture emerges from the regression results presented in Table 12, which confirm that there are significant impacts even after the treatment ends, of roughly the same order of

magnitude as the impacts during the second half of the treatment period.[25] Not surprisingly, when we use our event-study framework, we do not find any significant effect during the post-treatment period when the SMSs were not actually received. These results are shown in Figure 7 which presents the event study impacts in the post-treatment period restricted to the fixed schedule sub-treatment.[26]

The persistence of our impacts bolsters the evidence presented in sections 5 and 6.2, and is consistent with the notion that the ISP informational intervention led to persistent effects by changing the nature of parent-child interactions.[27]

6.4 Dynamics

Did the impacts associated with our interventions display different dynamics during the treatment period? Returning to Figure 6, we see that the impacts of the ISP information intervention increase over the first 4 weeks of treatment and then appear to stabilize through the rest of the treatment period. This pattern is confirmed in Table 12, which presents 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 4 presents the impacts from the event study for the first and second half of the treatment period (with Appendix Table 9 showing the coefficients and standard errors corresponding to these plots). The immediate effects of providing ISP

[25] 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 and the next section. Appendix Table A10 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.
[26] 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 random days of the week.
[27] Persistent effects of temporary informational interventions also appear in other contexts, such as energy consumption (Alcott and Rogers, 2014).

information were clearly stronger in the first half of the treatment period. They show large decreases in internet use of approximately 13 MBs on the day the SMS was received and 20 MBs one day after receipt of the SMS. In contrast, the impacts in the second half of the sample, while still negative, are not statistically significant. Thus, the immediate effect of receiving the SMSs themselves appears to fade out midway through the treatment period, and the persistence of the cumulative impacts is likely due to other changes in parent and child behavior, such as those described in section 6.2.

Next, we decompose the heterogeneous response in the first and second half of the treatment period between the random and fixed subgroups. In Figure 8, we plot the relative impact of receiving an SMS message in a less (vs. more) predictable fashion for each week in the pre-treatment, treatment and post-treatment periods. We 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 get accustomed to the messages that are arriving in predictable fashion. A similar pattern emerges in Figure 9 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.[28]

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 stronger or more salient cue of the random-schedule messages would become more important during the second part of the intervention, after parents

[28] We have also examined the effect of receiving a control (SMS-only) message separately for the random and non-random groups in Appendix Figure 1 and Appendix Table 11. There is a clear decline for the non-random subgroup on the day after the SMS is received, albeit with only half of the magnitude of the random group and it is insignificant given the sample size.

on the fixed-schedule have become accustomed to receiving their messages on the same day every week.

6.5 Interactions between treatments

Finally, we consider the interaction between our main treatments (i.e. the SMSs providing ISP information about internet use and offering assistance with parental control software) and our sub-treatments (which varied whether those SMSs were received on a random or a fixed schedule). These interactions effects are displayed in Table 13 for our combined treatments and in Appendix Table 12 for the separate treatments. In both cases, we observe main effects that are similar to the ones estimated in previous tables: receiving SMSs with ISP Information about internet use leads to significantly lower internet use; receiving reminders/assistance for installing parental control software has a negative but statistically insignificant impact on internet use; and receiving SMSs on a random schedule leads to 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 control group). This suggests that ISP information and the cue associated with a random schedule are, if anything, substitutes and not complements. In other words, providing specific information appears to crowd out the effect of the cue associated with the message (and vice versa), although this effect is not significant.

7. 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 can displace productive activities and expose students to inappropriate content. Our paper examines the role of imperfect information among parents and the potential for direct parental controls to affect children's internet use. We designed and implemented a set of randomized experiments to test whether children's internet use is affected by providing parents with specific information on this use, and to the offer of assistance with the installation of parental control software.

We find that sending SMSs to 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 a significantly lower intensity of internet use during the treatment period as compared to households in the control group who received a generic SMS. 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 do not find evidence indicating that these impacts are due to changes in internet use by other family members.

The impacts of providing ISP information to parents are concentrated in the upper quintiles of the distribution of internet use, and largest for children who used the computer frequently for playing games at baseline. Moreover, they appear to be driven by families in which parents either cannot observe or are uninformed about their children's internet use. Accordingly, we find larger impacts responses when the mother is not a "stay-at-home" mom, for single parent families, and for misinformed parents with low perceptions of their children's internet use at baseline and high actual use. We

also find larger impacts among parents who are more involved in their children's school life. These latter results suggest that our informational intervention substitutes for the presence of parents at home but complement parents' capacity to be involved in their children's lives. Using recent machine learning techniques, we provide complementary evidence that corroborates the results from our traditional heterogeneity analysis.

On the other hand, there is 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 two main 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. 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. Consistent with this, we find that parents who received ISP information are more likely to punish their children or discuss the problems of internet use with their children, as well as some evidence that parenting styles become less permissive.

Finally, we find that households who were sent SMSs on a less predictable schedule have 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, 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 results 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. However, we do not find strong evidence of

complementarities between our informational interventions and the (un)predictability of our SMS messages.

To conclude, we believe that the findings in this study contribute to our understanding about the role of imperfect information and parental controls for parental monitoring of children's internet use, and children's actions more generally. We also hope that they shed some light on how the cues associated with messages can affect 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. and Lindsay Page (2017) "Parental Influences on Postsecondary Decision Making: Evidence From a Text Messaging Experiment" *Educational Evaluation and Policy Analysis* 39(2): 361-377

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

de Walque, Damien and Christine Valente (2018) "Incentivizing School Attendance in the Presence of Parent-Child Information Frictions" World Bank Policy Research Working Paper 8476

Dizon-Ross, Rebecca (2018), "Parents' Beliefs and Children's Education: Experimental Evidence from Malawi," Working paper.

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

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

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

Malamud, Ofer, Diether Beuermann, Julian Cristia, and Santiago Cueto. 2018 "Do Children Benefit from Internet Access? Experimental Evidence from a Developing Country" Unpublished mimeo.

Muralidharan, K., M. Romero, and K. Wüthrich (2019) "Factorial Designs, Model Selection, and (Incorrect) Inference in Randomized Experiments" NBER Working Paper No. 26562

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

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 MBs downloaded + uploaded between September and December (the 15th).

Table 2: Summary Statistics

	Mean	S.D.
Panel A: Student Characteristics		
MBs used (pre-treatment)	173.97	210.06
Minutes of internet use (pre-treatment)	186.37	162.81
Lives with mother	0.96	0.20
Lives with father	0.62	0.49
Lives with Brother/Sister	0.76	0.42
Lives 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
Higher incomplete	0.04	0.20
Higher 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					
MBs used (pre-treatment)	176.40	176.71	176.73	175.52	0.998
	(212.02)	(207.57)	(207.16)	(212.85)	
Minutes of internet use (pre-treatment)	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: Column 5 presents the p-value of a F test of joint differences between T1, T2 and T3 and SMS-Only. MBs used (pre-treatment) are MBs downloaded + uploaded daily from September to December 15 in the pre-treatment period. Minutes of internet use (pre-treatment) are imputed daily minutes of internet use from September to December 15 in the pre-treatment period.

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
Additional 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
Additional 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 receipt of SMSs with 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. We control for strata fixed effects and internet use in the pre-period in all specification. Even-numbered columns present estimates including additional 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)
			What are you using the information in the SMS for? (cond. on receiving)					
	Have you ever received an SMS in your Phone from YEMPC program?	Do you remember what the SMS said?	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	-13.785*	-13.178*	-12.533*	-11.982*	-16.978**	-16.230**
	(7.098)	(7.086)	(7.220)	(7.215)	(7.509)	(7.471)
T_2	-1.394	-0.578	-0.190	0.569	-4.469	-3.504
	(7.548)	(7.512)	(7.588)	(7.562)	(8.125)	(8.060)
T_3	-12.213*	-11.744	-12.516*	-12.143*	-11.439	-10.723
	(7.162)	(7.148)	(7.173)	(7.168)	(7.867)	(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
Additional controls		X		X		X
Panel B: ISP Information and Parental Control						
ISP Information	-12.302**	-12.172**	-12.430**	-12.348**	-11.976**	-11.724**
	(4.865)	(4.848)	(4.911)	(4.893)	(5.218)	(5.200)
Parental Controls	0.088	0.429	-0.086	0.204	0.531	1.001
	(4.881)	(4.855)	(4.931)	(4.906)	(5.228)	(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
Additional controls		X		X		X

Note: This table presents estimated effects on Internet use measured as daily average MBs uploaded and downloaded. We control for strata fixed effects and internet use in the pre-period in all specification. Even-numbered columns present estimates including additional 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 Sub-treatment on Intensity of Internet Use

	(1)	(2)	(3)	(4)	(5)	(6)
Period:	All	All	Weekdays	Weekdays	Weekend	Weekend
Random	-12.845***	-12.401**	-13.588***	-13.123***	-10.950**	-10.557**
	(4.866)	(4.873)	(4.911)	(4.921)	(5.220)	(5.216)
Observations	7,707	7,707	7,707	7,707	7,707	7,707
Additional 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. We control for strata fixed effects and internet use in the pre-period in all specification. Even-numbered columns present estimates including additional 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: Heterogeneous Treatment Effects of ISP Information

Heterogeneity:	(1) ISP Info
Panel A: Parents as Moderators	
Mother is or not at home	
Mother at home	-8.46
	(6.87)
Mother not at home	-14.55**
	(7.14)
Single or not single-parent family	
Single-parent family	-26.31***
	(8.30)
Not single parent family	-3.87
	(5.92)
Parenting index	
High parenting index	-23.11***
	(6.51)
Low parenting index	7.82
	(7.38)
Mother's education	
Educated mother (high school graduate or above)	-12.66**
	(6.07)
Uneducated mother (below high school graduate)	-11.01
	(7.95)
Panel B: Frequency of Computer Use for Games and Homework at Baseline	
Frequent (daily) use for games	-36.48**
	(16.85)
Frequent (daily) use for homework	-11.01
	(11.17)
Infrequent use for games and homework	-5.31
	(5.50)
Panel C: Proxies for Internet Use by Parents and Other Family members	
Other People Use the PC at Baseline	
Nobody else uses the PC	-14.40***
	(5.27)
Other people use the PC	3.13
	(13.12)
Availability of Other Computers at Home in Baseline	
Other Computers Available	-14.53*
	(8.07)
No other Computers Available	-10.55
	(5.99)
Digital Competence of Parents at Baseline	
Parents without digital competence	-12.42**
	(5.91)
Parents with digital competence	-9.97
	(8.75)

Note: This table presents heterogeneous effects of estimated effects on Internet use measured as daily average MBs uploaded and downloaded. We control for strata fixed effects and baseline variables in all specification. Baseline variables include the values of mean of MBs of Internet use in pre-treatment period; 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: Heterogeneity Analysis using Machine Learning

Panel A: Best Liner Prediction (BLP)

Elastic Net		Random Forest	
ATE (β_1)	HET (β_2)	ATE (β_1)	HET (β_2)
-10.70	0.278	-10.23	0.356
(-24.71,3.283)	(0.063,0.498)	(-25.93,5.165)	(0.066,0.644)
[0.261]	[0.029]	[0.385]	[0.030]

Panel B: Sorted Group Average Treatment Effects (GATES)

Elastic Net			Random Forest		
Least Affected	Most Affected	Difference	Least Affected	Most Affected	Difference
9.591	-25.51	32.40	1.572	-25.77	32.60
(-23.63,41.72)	(-57.56,6.249)	(-13.87,79.61)	(-31.08,35.44)	(-60.78,8.438)	(-16.60,81.31)
[1.000]	[0.236]	[0.339]	[1.000]	[0.282]	[0.382]

Panel C: Classification Analysis (CLAN)

	Elastic Net			Random Forest		
	Least Affected	Most Affected	Difference	Least Affected	Most Affected	Difference
Mother at home	0.554	0.498	0.057	0.602	0.492	0.107
	(0.518,0.590)	(0.462,0.534)	(0.006,0.108)	(0.566,0.638)	(0.456,0.528)	(0.056,0.158)
	-	-	[0.059]	-	-	[0.000]
Single-parent family	0.303	0.449	-0.172	0.332	0.391	-0.057
	(0.268,0.338)	(0.416,0.482)	(-0.221,-0.123)	(0.297,0.367)	(0.356,0.426)	(-0.106,-0.008)
	-	-	[0.000]	-	-	[0.047]
High parenting	0.467	0.746	-0.306	0.593	0.692	-0.102
index	(0.434,0.500)	(0.713,0.780)	(-0.354,-0.259)	(0.559,0.628)	(0.657,0.726)	(-0.151,-0.053)
	-	-	[0.000]	-	-	[0.000]
Educated mother	0.574	0.617	-0.049	0.605	0.586	0.021
	(0.539,0.610)	(0.582,0.653)	(-0.099,0.001)	(0.569,0.641)	(0.551,0.622)	(-0.029,0.072)
	-	-	[0.112]	-	-	[0.816]
Frequent use	0.094	0.318	-0.217	0.131	0.197	-0.068
for games	(0.066,0.121)	(0.291,0.345)	(-0.258,-0.176)	(0.105,0.158)	(0.170,0.223)	(-0.106,-0.029)
	-	-	[0.000]	-	-	[0.001]
Frequent use	0.275	0.363	-0.088	0.276	0.344	-0.068
for homework	(0.241,0.308)	(0.330,0.397)	(-0.136,-0.040)	(0.242,0.309)	(0.310,0.377)	(-0.116,-0.021)
	-	-	[0.001]	-	-	[0.005]
Nobody else	0.872	0.867	0.006	0.843	0.886	-0.042
uses the PC	(0.847,0.896)	(0.842,0.891)	(-0.028,0.041)	(0.819,0.868)	(0.861,0.912)	(-0.077,-0.008)
	-	-	[1.000]	-	-	[0.036]
Other computers	0.381	0.474	-0.096	0.406	0.405	-0.002
available	(0.345,0.417)	(0.439,0.510)	(-0.146,-0.045)	(0.370,0.442)	(0.369,0.441)	(-0.052,0.048)
	-	-	[0.000]	-	-	[1.000]
Parents with	0.352	0.303	0.050	0.334	0.329	0.001
digital competence	(0.318,0.386)	(0.270,0.337)	(0.002,0.098)	(0.300,0.368)	(0.295,0.363)	(-0.047,0.050)
	-	-	[0.083]	-	-	[1.000]

Notes: Medians over 100 splits. 90% confidence intervals in parenthesis. P-values for the null hypothesis that the parameter is equal to zero in brackets

Table 10: Heterogeneous Treatment Effects of ISP Information by Parental Priors

Perception of High Internet Use: Correct	-14.907
	(14.143)
Perception of High Internet Use: Wong	-6.229
	(5.540)
Perception of Low Internet Use: Correct	-6.969*
	(3.672)
Perception of Low Internet Use: Wrong	-18.861*
	(9.747)

Note: This table presents heterogeneous effects of estimated effects on Internet use measured as daily average MBs uploaded and downloaded over the first half of the treatment period. We control for strata fixed effects and baseline variables. Baseline variables include the values of mean of MBs of Internet use in pre-treatment period; 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 11: Parental Responses

	(1) Has there been any problem related with computer use?	(2) Has there been any punishment related to these problems?	(3) Have you discussed the issue calmly with the Child?	(4) Do you have information to back up your decisions?	(5) Parenting style: authoritative	(6) Parenting style: authoritarian	(7) Parenting style: permissive
ISP Information	0.017**	0.015*	0.014*	0.015*	0.000	0.019	-0.039*
	(0.008)	(0.008)	(0.008)	(0.008)	(0.014)	(0.018)	(0.022)
Parental Controls	0.002	0.001	0.002	0.000	0.010	-0.007	0.017
	(0.009)	(0.008)	(0.008)	(0.009)	(0.014)	(0.018)	(0.022)
Observations	3,967	3,968	3,969	3,971	3,852	3,852	3,852
Control Mean	0.0712	0.0582	0.0642	0.0701	4.481	1.851	2.788

Notes: This table presents estimated effects on some parent reactions measured in the follow-up survey. Control variables in all columns 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). In addition, control variables in columns 5 to 7 also include the parenting index at baseline. 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 12: 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

Table 13: Interactions of Treatments with Sub-treatment

	(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

Figure 1: Timeline

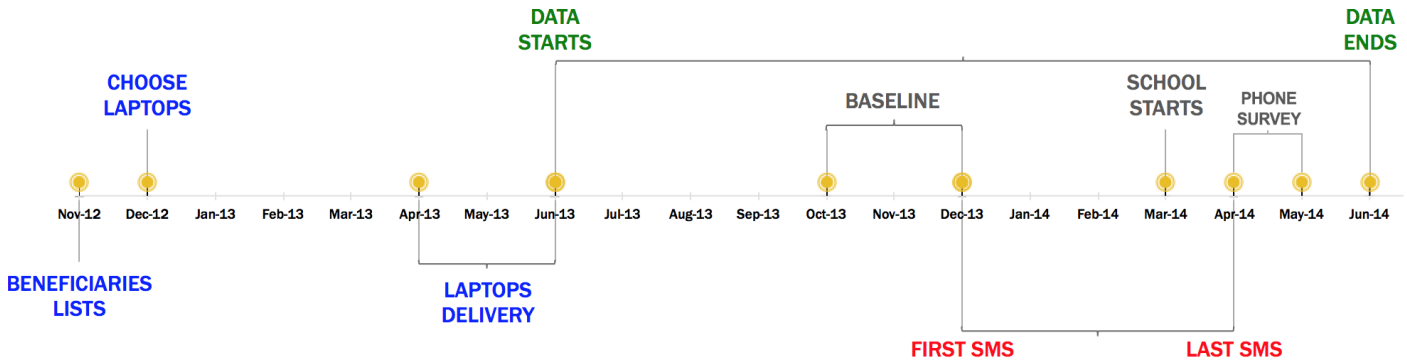
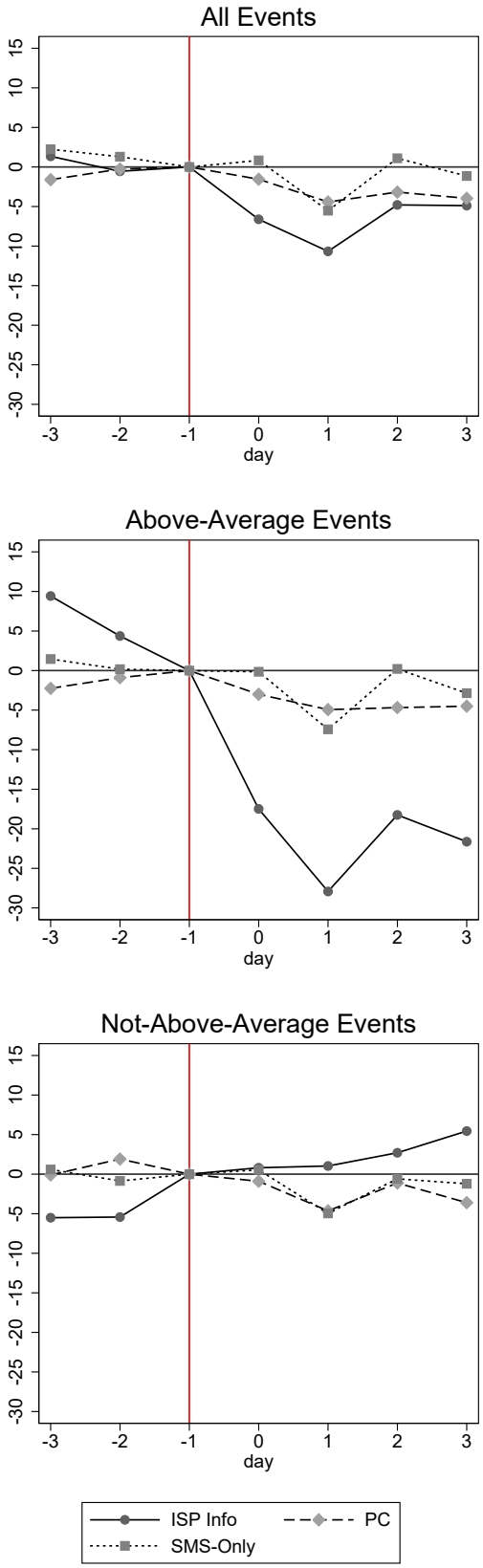
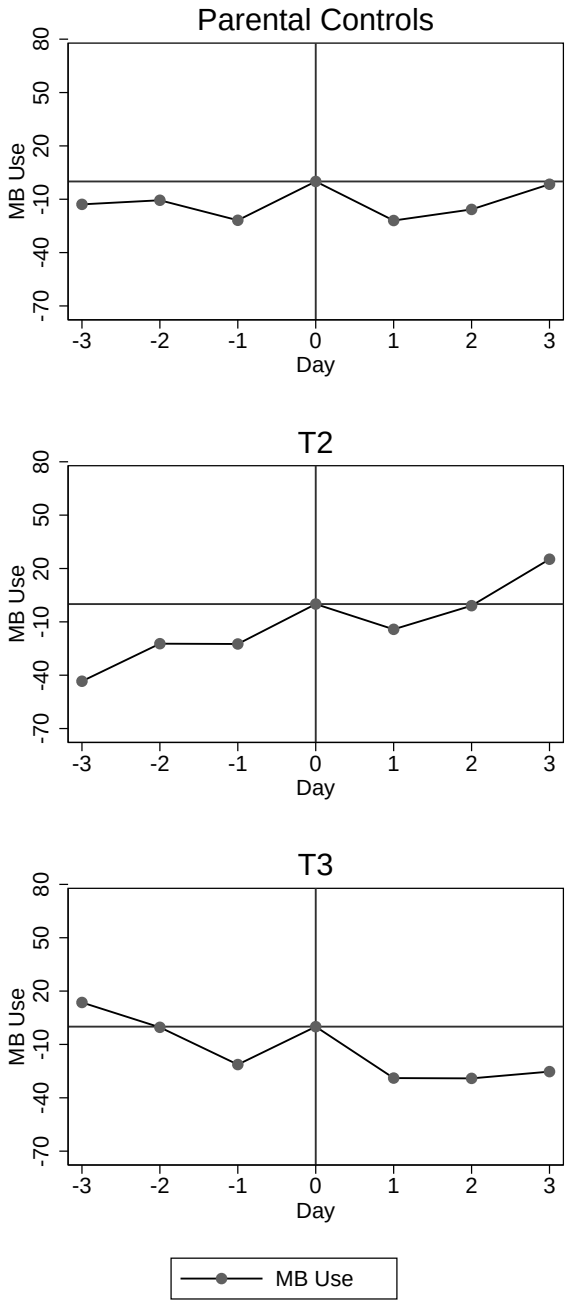


Figure 2: Event Study for ISP Information and Parental Controls



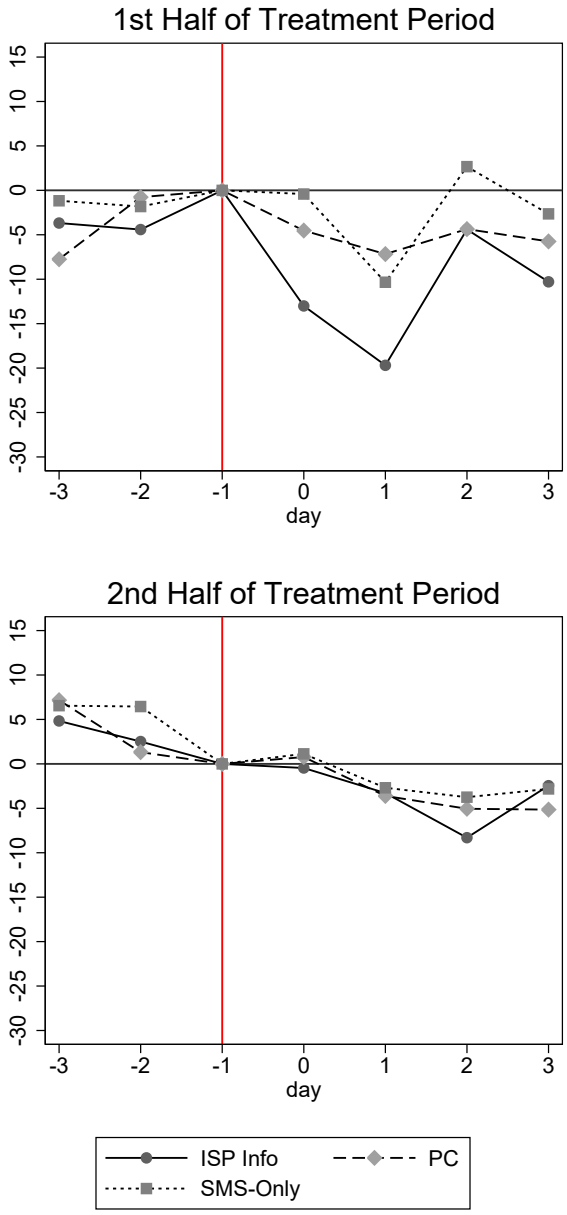
Notes: This figure presents estimated effects for each treatment group for days around the receipt of an SMS message. Day 0 marks the day on which the SMSs are received each week. Above-average events are events where the SMS said the student used more internet than the average student during the past week. See Appendix Table 6 for more details.

Figure 3: W8 Install Event Study



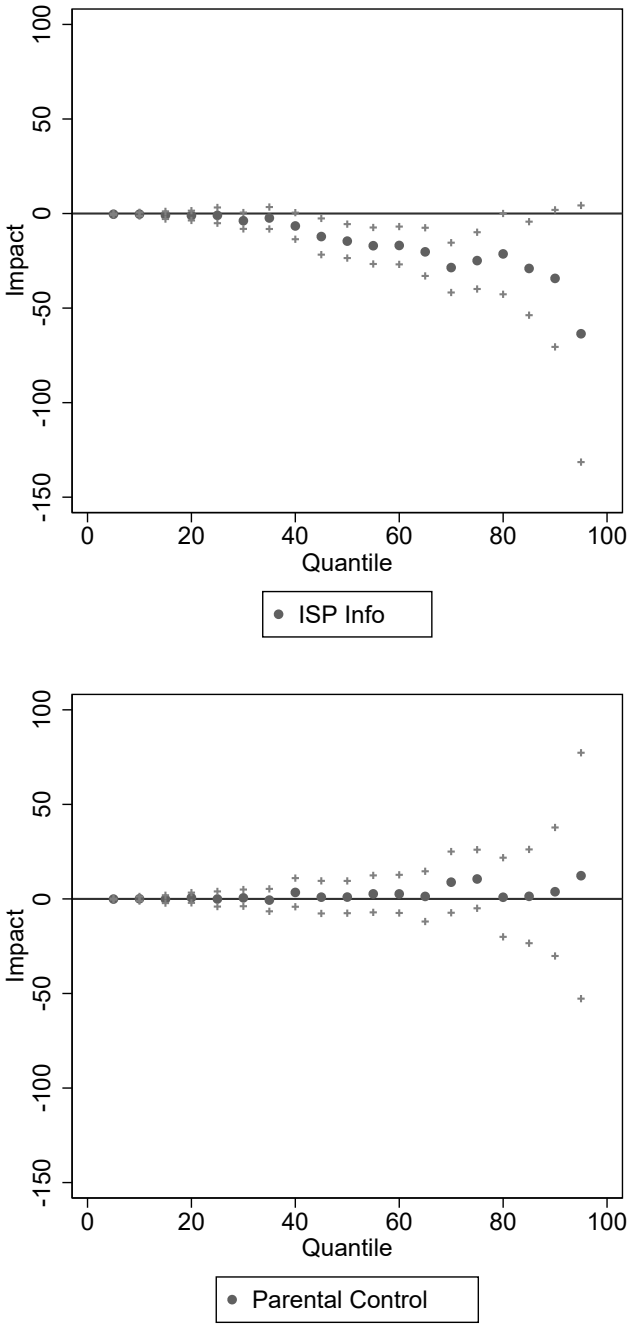
Notes: This figure presents estimated effects for the installation of the W8 parental control settings on Internet use, measured using MBs downloaded and uploaded. Day 0 marks the day on which the program was installed. We control for seasonality in every panel. See Appendix Table 7 for more details.

Figure 4: Event Study Dynamics



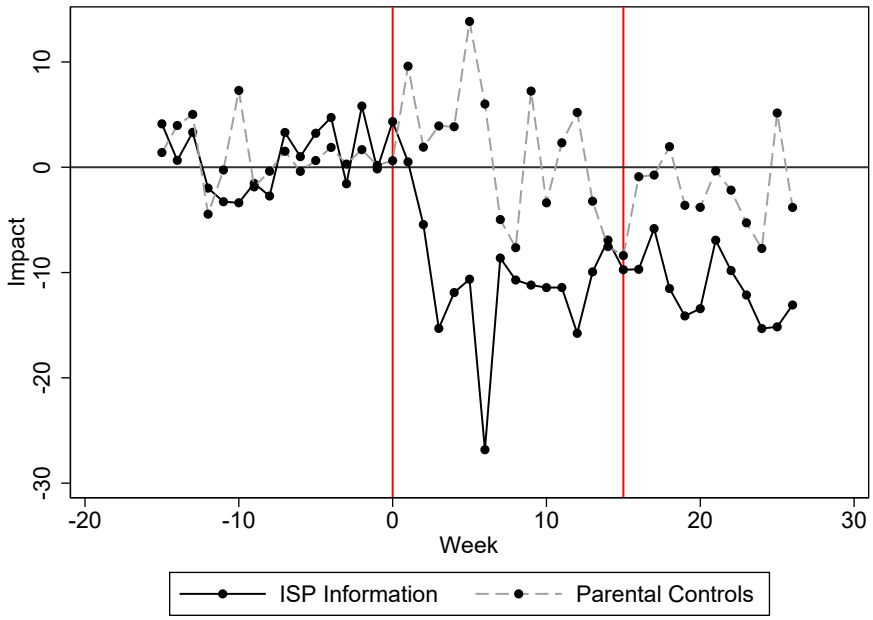
Notes: This figure presents estimated effects for each treatment group for days around the receipt of an SMS message, separating the treatment period in two. Day 0 marks the day on which the SMSs are received each week. See Appendix Table 9 for more details.

Figure 5: Quantile Regression



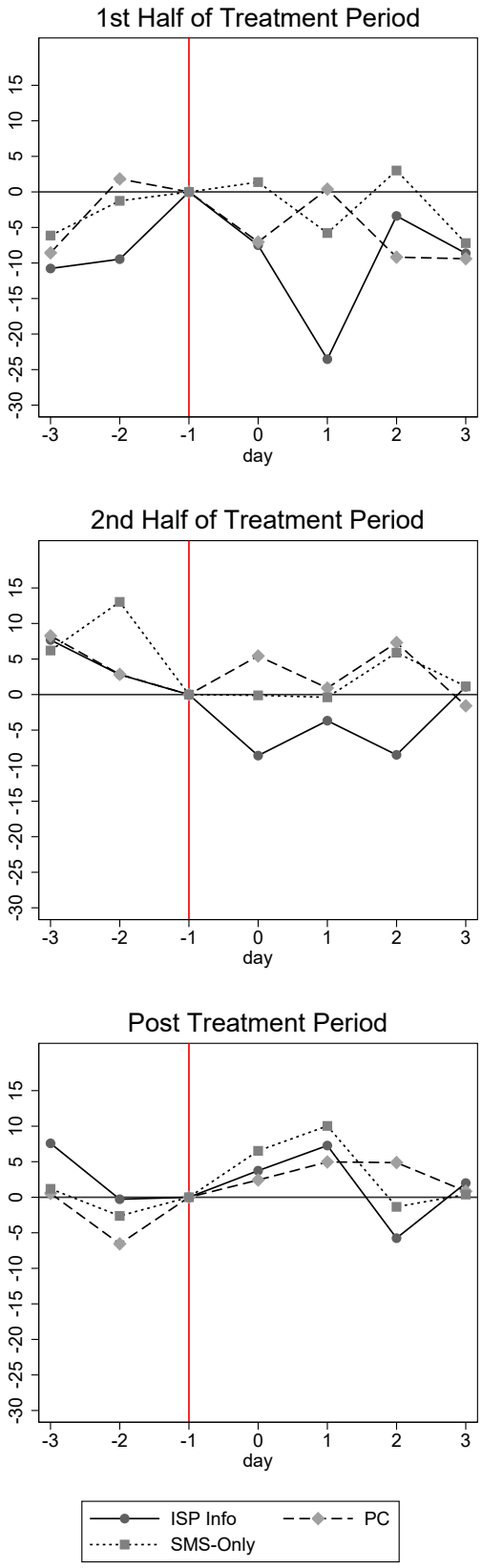
Notes: This figure presents estimated effects from the quantile regressions presented in Appendix Table 6.

Figure 6: Impact on MB Use Across Weeks



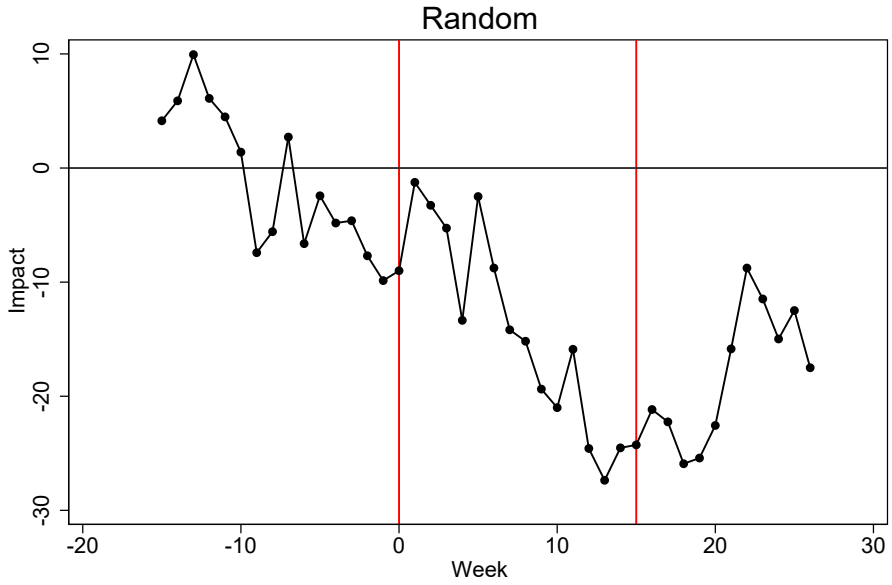
Notes: This figure presents estimated effects for each treatment group (with respect to the control group) for each week of the experiment on Internet use measured as daily average. Control variables include the baseline values of mean of MBs of Internet use; guardian gender, age, education level and 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 7: Event Study Dynamics and Persistence for Fixed Subgroups



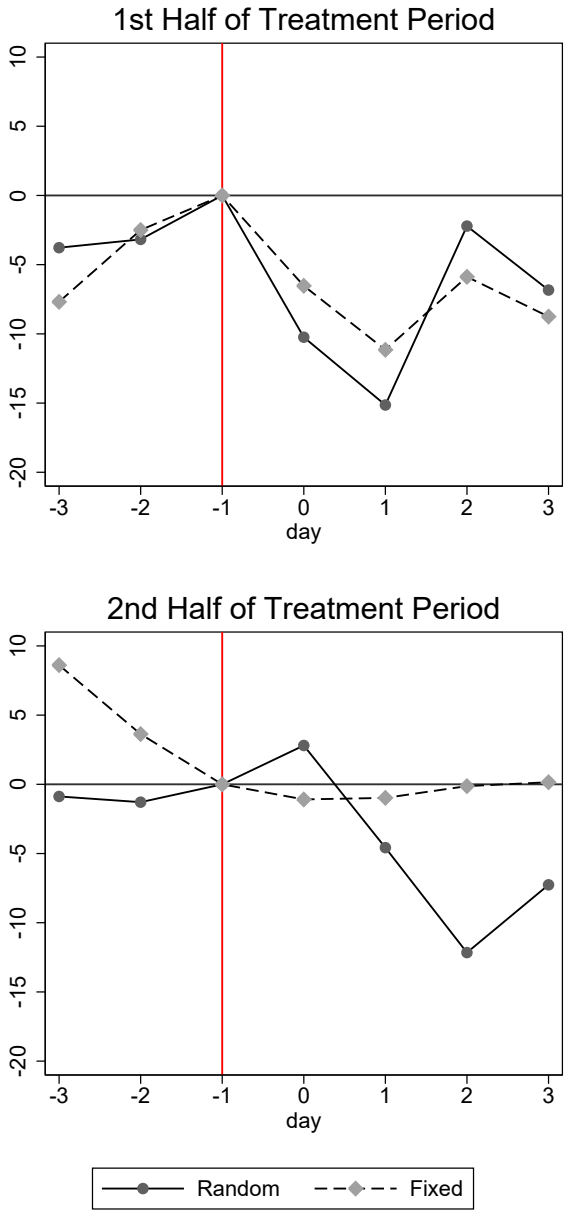
Notes: This figure presents estimated effects for each treatment group restricting the sample to the Fixed sub-group for days around the receipt of an SMS message. Day 0 marks the day on which the SMSs are received each week. See Appendix Table 11 for more details.

Figure 8: Impact of Random on MB Use Across Weeks



Notes: This figure presents estimated effects 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 9: Event Study Dynamics for Random vs. Fixed



Notes: This figure presents estimated effects for Random and Fixed sub-groups for days around the receipt 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.

Table A1: Sample Comparisons

Sample:	Full	Experiment	Survey
Panel A: Student Characteristics			
MBs used (pre-treatment)	180.35	176.34	177.65
	(213.15)	(209.88)	(216.79)
Minutes of internet use (pre-treatment)	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)
Higher incomplete	0.03	0.04	0.04
	(0.18)	(0.19)	(0.19)
Higher 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 Sub-treatment

	(1) Random	(2) Fixed	(3) P-Value
Panel A: Student Characteristics			
MBs used (pre-treatment)	175.71	176.15	0.791
	(205.91)	(212.80)	
Minutes of internet use (pre-treatment)	186.12	186.54	0.832
	(162.75)	(162.87)	
Lives with mother	0.96	0.96	0.497
	(0.20)	(0.19)	
Lives with father	0.61	0.62	0.113
	(0.49)	(0.48)	
Lives with Brother/Sister	0.76	0.77	0.296
	(0.43)	(0.42)	
Lives 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: Guardian 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)	
Higher incomplete	0.04	0.05	0.072
	(0.19)	(0.21)	
Higher 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 Follow-up Survey Sample

	(1) T_1	(2) T_2	(3) T_3	(4) SMS-Only	(5) P-Value(F-Test)
Panel A: Student Characteristics					
MBs used (pre-treatment)	172.22	182.96	174.10	184.84	0.472
	(212.34)	(217.43)	(201.26)	(235.60)	
Minutes of internet use (pre-treatment)	180.47	191.39	185.34	187.61	0.505
	(159.27)	(166.27)	(162.66)	(162.93)	
Lives with mother	0.96	0.97	0.97	0.95	0.041
	(0.19)	(0.17)	(0.17)	(0.22)	
Lives with father	0.65	0.65	0.64	0.62	0.345
	(0.48)	(0.48)	(0.48)	(0.49)	
Lives with Brother/Sister	0.77	0.79	0.80	0.74	0.030
	(0.42)	(0.41)	(0.40)	(0.44)	
Lives 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)	
Higher incomplete	0.03	0.04	0.04	0.03	0.290
	(0.17)	(0.20)	(0.21)	(0.18)	
Higher 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
Additional Controls		X		X
Control Mean	0	0	0	0

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 controlling for MB Use at baseline and even-numbered columns present estimates including all 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	-7.910**	-7.641**	-7.658**	-7.360**	-8.553**	-8.356**
	(3.389)	(3.388)	(3.374)	(3.373)	(3.599)	(3.599)
T_2	0.529	0.834	0.548	0.879	0.479	0.720
	(3.459)	(3.459)	(3.435)	(3.437)	(3.700)	(3.697)
T_3	-5.789*	-5.507	-5.998*	-5.688*	-5.257	-5.045
	(3.380)	(3.386)	(3.345)	(3.351)	(3.647)	(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
Additional controls		X		X		X
Panel B: ISP Information and Parental Control						
ISP Information	-7.114***	-6.991***	-7.102***	-6.963***	-7.145***	-7.060***
	(2.388)	(2.389)	(2.370)	(2.370)	(2.558)	(2.560)
Parental Controls	1.324	1.484	1.104	1.275	1.886	2.016
	(2.389)	(2.393)	(2.370)	(2.375)	(2.560)	(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
Additional 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 controlling for time use at baseline and even-numbered columns present estimates including all 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: Quantile Regressions

Heterogeneity:	(1) ISP Info	(2) PC
Q5	-0.360*	-0.080
	(0.210)	(0.157)
Q10	-0.324	0.091
	(0.594)	(0.739)
Q15	-0.869	-0.138
	(1.227)	(1.261)
Q20	-1.058	0.647
	(1.570)	(1.647)
Q25	-0.942	-0.029
	(2.529)	(2.437)
Q30	-3.791	0.565
	(2.632)	(2.685)
Q35	-2.354	-0.606
	(3.523)	(3.603)
Q40	-6.551	3.442
	(4.275)	(4.602)
Q45	-12.154**	0.945
	(5.817)	(5.241)
Q50	-14.561***	1.004
	(5.450)	(5.190)
Q55	-17.015***	2.687
	(5.866)	(5.938)
Q60	-16.877***	2.665
	(6.079)	(6.130)
Q65	-20.243***	1.351
	(7.745)	(8.072)
Q70	-28.573***	8.878
	(8.006)	(9.833)
Q75	-24.879***	10.564
	(9.128)	(9.417)
Q80	-21.330	0.896
	(12.985)	(12.721)
Q85	-29.018*	1.397
	(15.028)	(15.073)
Q90	-34.287	3.816
	(22.024)	(20.652)
Q95	-63.552	12.297
	(41.254)	(39.527)

Note: Each row of the table presents estimated effects on Internet use for quintile X as QX. Estimated standard errors using bootstrapping are reported in parentheses. * Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level.

Table A7: 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 A8: W8 Parental Control Settings Installation, Event Study

	(1) Day -3	(2) Day -2	(3) Day -1	(4) Day 0	(5) Day 1	(6) Day 2	(7) Day 3
Panel A: Parental Controls							
MB Use	-12.852	-10.555	-21.823	0	-21.960	-15.711	-1.548
	(28.384)	(28.375)	(28.367)	(0)	(28.362)	(28.372)	(28.382)
Panel B: T2							
MB Use	-43.390	-22.280	-22.451	0	-14.188	-0.901	25.217
	(49.181)	(49.166)	(49.153)	(0)	(49.143)	(49.153)	(49.166)
Panel C: T3							
MB Use	13.607	-0.367	-21.302	0	-28.914	-29.069	-25.277
	(31.493)	(31.483)	(31.474)	(0)	(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 A9: 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 Period							
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)
SMS-Only	-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 Period							
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)
SMS-Only	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 A10: Impact of Treatments on Intensity of Internet Use, Pre/Post School

	(1) Summer	(2) School-in-session
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	All	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	All	All
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 A11: Event Study for SMS-Only group, 1st Half and 2nd Half of Treatment

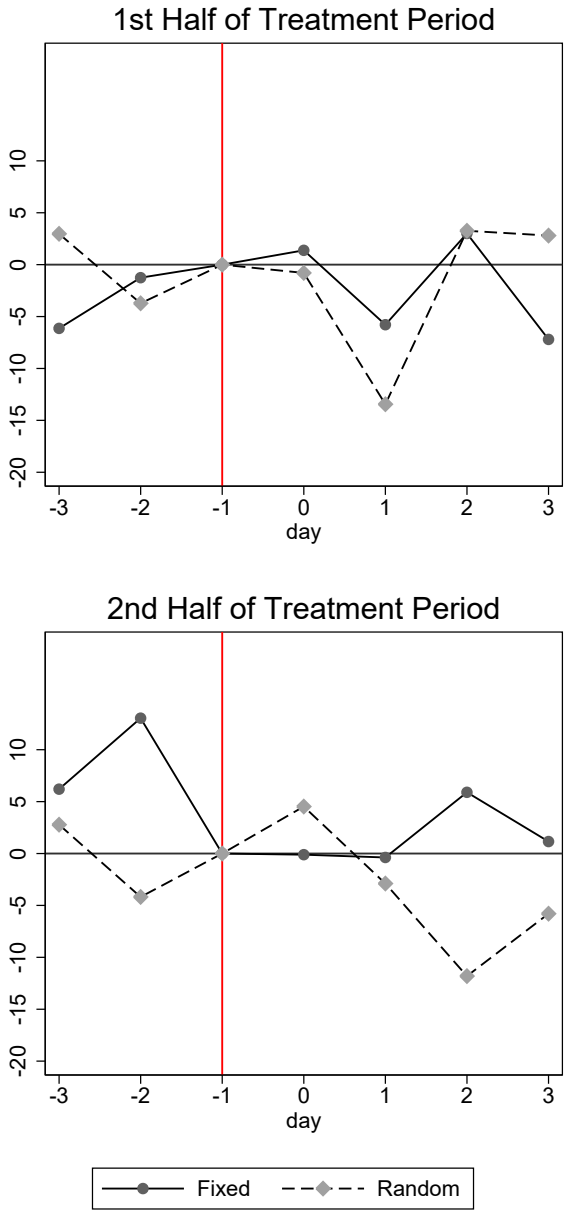
	(1) Day -3	(2) Day -2	(3) Day -1	(4) Day 0	(5) Day 1	(6) Day 2	(7) Day 3
Panel A: 1st Half of Treatment							
Fixed	-6.137	-1.255	0	1.381	-5.785	3.008	-7.202
	(8.202)	(8.159)	(0)	(7.962)	(8.017)	(8.070)	(8.074)
Random	2.974	-3.720	0	-0.795	-13.445	3.266	2.802
	(9.462)	(9.053)	(0)	(8.258)	(8.310)	(8.414)	(8.517)
Panel B: 2nd Half of Treatment							
Fixed	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)
Random	2.779	-4.182	0	4.528	-2.890	-11.806	-5.794
	(10.684)	(10.081)	(0)	(9.284)	(9.244)	(9.242)	(9.333)

Note: This table presents estimated effects on Internet use measured as MBs downloaded and uploaded for different days around the reception of a SMS for the SMS-only group. 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: 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

Figure A1: Event Study Dynamics: SMS-only group



Notes: This figure presents estimated effects for the SMS-only group for days around the receipt 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 11 for more details.