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Energy Saving Through Climate Education: Climate Sensitization in School for Mindful Consumption at Home

Haritha Saranga
Professor of Production and Operations Management
Indian Institute of Management Bangalore
Bannerghatta Road, Bangalore – 560 076
haritha.saranga@iimb.ac.in

Satyajit Roy
Doctoral Student
Production and Operations Management
Indian Institute of Management Bangalore
Bannerghatta Road, Bangalore – 560 076
satyajit.roy21@iimb.ac.in

Kanchan Mukherjee
Professor of Organizational Behavior & Human Resources Management
Indian Institute of Management Bangalore
Bannerghatta Road, Bangalore – 560 076
kanchan.mukherjee@iimb.ac.in

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Abstract

An effective fight against climate change requires both a “top-down” approach and “bottom-up” changes; that is, adopting sustainable practices at the individual and household levels, which requires knowledge, belief, and willingness to engage in climate action. Extant research has shown a number of challenges in bringing about persistent changes in human behavior. We propose to bring about mindful energy consumption behavior at the household level by using children as the conduit for behavior change. Scalable interventions that create awareness about climate change and its impact through early self-regulation in middle and high schools are a promising and cost-effective opportunity to instill climate-friendly behavior directly in children and indirectly in their household members. There are three clear advantages of this approach: 1) schools provide useful aggregation points for behavioral interventions; 2) children of the house, providing the impetus for behavior change, are likely to have a greater impact than other sources of change; and 3) interventions through schools can be more scalable, thereby achieving a wider reach compared to other methods. Our field study, conducted in a middle school in a big city, has shown promising results, with an average reduction of over 10% in household electricity consumption.

Keywords: Behavioral Intervention, Responsible Consumption, Climate Action, Sustainability Education, Energy Consumption

1. Introduction

Over the past century, the relentless pursuit of economic and industrial advancement has resulted in the depletion of Earth's resources and endangered fragile ecological and climatic balance. As the global average temperature increases at an accelerated pace, extreme events, such as heat waves, wildfires, flash floods, and storms, are set to rise (Seneviratne et al., 2021). Despite this, the demand for emission-intensive energy sources continues to increase. Global electricity demand is projected to increase by nearly 100%, driven by high growth in demand from emerging markets[1]. An effective fight against climate change requires both a "top-down" approach i.e., structural adjustments and regulatory interventions, and "bottom-up" changes i.e., environmentally sustainable lifestyles at an individual and community level (Vlasceanu et al., 2024). However, most sustainability efforts across the globe have been "top-down" in nature, including the European Green Deal[2], Britain's Climate Change Act[3] and USA's Inflation Reduction Act[4]. In addition, the primary thrust of any resource management policy thus far has been to tackle issues on the supply side, for example, through the development of technologies for clean energy production. However, unless these are supplemented with demand-side initiatives that target responsible consumption (SDG 12), it will be too difficult to limit climate change. To meet the currently agreed limit of 2^oC, the average annual carbon footprint across the globe must fall below two tons per capita by 2050[5] which calls for immediate climate action (SDG 13) at every fronts.

According to the International Energy Agency, the generation of heat and electricity contributes to a significant percentage of greenhouse gas (GHG) emissions worldwide. Since substantial consumption of resources occurs at the household level[6], we explore different behavioral pathways to induce energy conservation in urban households. Research has shown that pro-environmental household behavior can help in the rapid reduction of carbon emissions (Dietz et al., 2009), and when scaled up and practiced by a large number of people, individual efforts can make a significant difference in global emissions. According to the United Nations Environment Program (UNEP), even if 10-15% of the world's population makes environmentally friendly choices in daily life, global carbon emissions may be reduced by nearly 20%[7].

An analysis of energy-efficient interventions revealed that the persistence of a treatment effect relies on multiple factors, such as building psychological habits and changes in thought processes (Frey & Rogers, 2014). A study on household energy consumption showed that repeated interventions for a long time could lead to developing a new "capital stock," either in terms of "physical capital," such as energy-efficient appliances or "consumption capital," such as better energy use habits, which in turn leads to lower consumption of energy. However, once the intervention is stopped, the effects decay by 10-20% per year (Allcott & Rogers, 2014). Another study, using energy consumption data from 38 field experiments, argued that the effect of nudges is persistent if they can be administered through technology adoption channels (Brandon et al., 2017).

Extant research has shown a number of challenges in bringing about persistent changes in human behavior (Carman & Zint, 2020). Many actions that directly affect resource consumption in

[1] As per the IEA's Stated Policies Scenario (STEPS) in World Energy Outlook 2023
[2] The European Green Deal https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal_en - Last accessed on 20 November 2024.
[3] How is the UK tackling climate change? https://eciu.net/analysis/briefings/uk-energy-policies-and-prices/how-is-the-uk-tackling-climate-change - Last accessed on 20 November 2024.
[4] Inflation Reduction Act https://home.treasury.gov/policy-issues/inflation-reduction-act - Last accessed on 20 November 2024.
[5] What is a carbon footprint? https://www.nature.org/en-us/get-involved/how-to-help/carbon-footprint-calculator/ - Last accessed on 20 November 2024.
[6] Household consumption makes up approximately 25% of the world's total electricity use
[7] 10 ways you can help fight the climate crisis https://www.unep.org/news-and-stories/story/10-ways-you-can-help-fight-climate-crisis - Last accessed on 20 November 2024.

households are the result of everyday routine activities and are habitual in nature. These activities are executed with minimal conscious thought and are difficult to change. Past research has shown that our brains employ two fundamentally different modes of processing information: an evolutionarily old Type 1 process that is fast, automatic, associative, and affective, and a relatively new Type 2 process that is slow, deliberate, sequential, and analytical (Wason & Evans, 1974; Evans, 1989); which are often referred to as System 1 and System 2 thinking (Stanovich,1999; Kahneman, 2011). Behavior is guided by either of these two processes or, most commonly, by an interaction between the two (Mukherjee, 2010; Evans & Stanovich, 2013). When any activity is repeated regularly in familiar settings, it enters automatic mode. This habit formation is an adaptation that is affected by the brain to conserve limited cognitive resources. Hence, repetitive activities, such as brushing teeth, washing dishes, or switching on/off electrical appliances, are largely habit-driven, and any persistent behavior requires interventions that can change these largely automatic responses (Jager, 2003; Wood & Rünger, 2016).

Interventions that foster self-regulation during the formative years of childhood have a lasting, stable, and cost-effective effect on children's behavior of children (Howard & Williams, 2018). Schools are an effective setting for promoting healthy lifestyles in children (Sevil et al., 2019). Given that the future of humankind is at stake owing to global warming and climate change (Sanson et al., 2019), it makes sense to sensitize children by providing them with sufficient information and knowledge about the impact of consumption on climate change. While there is limited research on how behavioral interventions with schoolchildren can have a carry-forward effect at the household level, a recent intervention in five Australian schools was found to be effective in changing the consumption habits of parents along with the students and reducing food waste at home significantly (Boulet et al., 2022).

In this intervention-based study, we propose to bring about conservation behavior in the domestic use of energy by using schoolchildren as conduits for effecting behavioral change in their households. Scalable interventions that create awareness of climate change and its impact through early self-regulation in middle and high schools are potentially promising opportunities to instill eco-friendly behavior in children (Reid, 2019). We examine whether children, when sensitized to climate change, aspire to be sustainability *leaders* in their households and take the responsibility of pushing family members into mindful consumption practices. Our field study, conducted in a middle school in a large city, showed promising results. In measurable terms, this resulted in an average reduction of over 10% in household electricity consumption. The resource-light nature of the intervention and its implantability in a *business-as-usual* setup without any specific requirements makes it easily scalable and provides a critical mechanism to potentially bring about large-scale behavior change.

2. Theoretical Background

The "bottom-up" approach of adopting sustainable practices at the individual level requires knowledge, beliefs, and willingness to engage in climate action (Otto et al., 2020; Ivanova et al., 2020). We designed our study following the habit-change framework of (Vivek et al., 2021). The first step in the behavior change process is to bring awareness that it needs to change in the first place. If one is not aware of the consequences of climate change, why would one feel the need for change? Most people are unaware of the link between energy and climate change. In upper-middle-class and rich households, the electricity bill is a very small part of the total monthly expenditure; hence, it has attracted little attention. In many households, the electricity bill is auto-debited from the bank account every month, and family members may not even know the bill amount or quantity consumed. In addition, the lack of tangibility in commodities like electricity does not really help attract the attention it deserves. For any behavioral change to occur, first, the problem needs to receive adequate attention from people, which is the first stage of our intervention. Once the problem is brought into our cognitive radar by an appropriate intervention, our responses become less automatic as our Type 2 processes kick in, and we are forced to pay deliberate attention to the problem and its consequences. In this situation, new conservation-friendly behaviors can be

induced, possibly with the help of suggestions embedded in the intervention. Then, with positive reinforcement and repetition over a period, new behaviors can be encoded in our Type 1 processes and become our new habits.

In addition to behavioral changes in individuals in a household, another challenge is scaling up interventions to achieve widespread behavioral change. Targeting individual households at the macro-level is a major challenge. Hence, a scalable intervention conduit would be to target places of human congregation, such as religious places and educational places, such as schools/colleges, markets, and social media. Given the nature of our research question, our study targets intervention efforts in a school, with middle-school children being the focus of our change proposition. In our intervention, we sensitized the children through awareness sessions and encouraged them to not only adopt conservation behaviors themselves, but also advocate for the same among their family members.

We targeted schoolchildren for our intervention because of three main reasons. First, according to studies in human psychology, people are most influenced by social relationships (Videras et al., 2012) and especially those who are emotionally close to them (Brussoni & Boon, 1998). Most people are emotionally close to their family members, and the bonding between parents and children is the strongest. Hence, children providing the impetus for behavioral changes is likely to have a greater impact on family members than any other source of change. Second, the school provides a natural aggregation point and a support system for conducting behavioral interventions, specifically through awareness sessions and indirect nudges for behavioral change, as an extension to the Environmental Sciences curriculum. Building environmental awareness and actively participating in adopting and spreading positive conservation behavior aligns well with the experiential learning pedagogy embedded in a school curriculum. Finally, an intervention through schools is less likely to be resource- and effort-intensive, making it easier to achieve a wider reach than other setups.

3. Study Design

Based on the above theoretical background, we hypothesize that a climate-sensitization intervention among schoolchildren would have a positive effect on the family members' consumption behavior. Our treatment group consisted of middle school children in grades Six and Eight. We believe that this age group is optimal, as the children are old enough to appreciate the basic ideas of climate change and resource conservation. At the same time, they are yet to face serious academic pressures and can dedicate some time to this exercise (this is applicable to the Indian school system; it may differ in other countries, and grades can be chosen accordingly).

As monthly electricity bills were available for all households, we used monthly electricity consumption data to test our hypothesis for energy consumption. We collected anonymized monthly electricity consumption units (in kWh, as reported in the electricity bill) from the parents three months before, during, and three months after the intervention. The objective was to measure the difference in the average household electricity consumption between the pre- and post-intervention stages for the treatment group.

To control for the effect of weather and any other common factor(s) affecting all households, we compared the electricity consumption data from treatment households with that of a reference group for the same period. This reference group was a residential colony in the vicinity of a school in the same city. Both the treatment and reference group families reside within a radius of a few kilometers. Although this may not be an ideal control group in a difference-in-differences analysis, we believe that it suffices as a reference to satisfactorily account for seasonal weather and any other common effects that can impact electricity consumption, such as sports or political events on TV.

Hypothesis: *Sustainability-related intervention in school children will lead to a significant reduction in their household electricity consumption.*

The study consisted of an intervention spanning a period of four weeks and pre- and post-intervention periods of 12 weeks each (Figure 1). The intervention, in the form of awareness sessions, was conducted in a well-known private school in Bangalore, India, with 129 students in grade Six and 125 students in grade Eight.

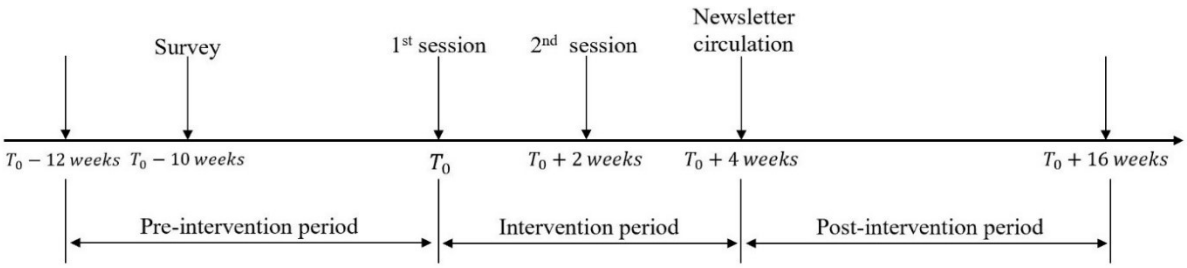

Figure 1. Timeline of events.

In the pre-intervention period, we conducted an in-class survey (without providing any context to the planned intervention) for the students to gauge the environmental attitudes of their families. The students responded to the survey using a pen on paper in a regular classroom environment. There were 13 questions centered on daily practices in their households (see Appendix A). Along with the survey questionnaire, the students were assigned a unique project code (UPC). This code was randomly assigned to mask students' identities. The same UPC was used for electricity data collection from the households.

During the intervention period, two back-to-back environmental sensitization sessions (two weeks apart) titled "Mindful consumption for sustainable future" (see Appendix B for session outline) were conducted in classroom environments (separately for the two grades). In the first session, the focus was on creating awareness about the root causes of global warming and climate change, the seriousness of the problem, its consequences, and how it will affect future generations (including the children's own future). This session was conducted using slides, videos, and visuals (see Supplementary Material). The students were asked to discuss the same with their parents and family members, watch the videos again with their parents; links to the videos were shared with the parents through email (see Appendix C). The session also provided information on how one can help mitigate climate change, what daily practices should be adopted for sustainable living, and how everyone should take responsibility for spreading awareness and making changes happen. At the end of the session, the children were asked to practise a list of easy-to-adopt action items that help form the habit of a sustainable lifestyle (e.g., switching off the lights when not necessary, keeping AC at 24 degrees or above, taking the stairs instead of the elevator).

The first session was followed by a follow-up session after two weeks. During the second session, the focus was on (i) linking the various extreme events children faced in their daily lives to climate change, (ii) reminding the children about the best practices one can adopt to mitigate climate change, and (iii) sharing of experiences by the children while putting some of these best practices into action in their own households. Three more videos (see Supplementary Material) depicting how children can bring about a change were shown, and the action items (that were suggested during the first session) were recalled, reinforcing the need for adopting sustainable lifestyles. After the session, all the students took an oral pledge to adopt a sustainable lifestyle and be conscious about their resource consumption to save the environment.

After the first session, the students were also instructed to make note of their innovative ideas and environment-friendly practices adopted at their homes. They were asked to share those ideas or deeds with the class at least once a week. This was to encourage students to work with their parents and siblings at their own homes to identify sustainable domestic practices on a daily basis, so that these repeated activities could help trigger System 2 thinking in the entire household. During the intervention period, students shared their eco-friendly ideas and/or sustainable practices adopted at home, in regular classroom sessions in the presence of their classmates and teachers (see Appendix D for a sample idea sheet).

Four weeks after the first session, a newsletter (see Appendix E for a sample newsletter) was circulated among the parents (through email), as well as in the classrooms (hard copies put on display on the wall of the classrooms). The newsletter recognized the best ideas and climate-friendly deeds originating from the students during the intervention period. It also included a few statistics on climate change, as well as information and tips for climate-friendly behavior. The purpose of the newsletter was to act as a reminder for the households to adopt sustainable lifestyles and to encourage children to continue their sustainability efforts. This marked the end of the intervention.

In the post-intervention period of 12 weeks, similar to the pre-intervention period, household electricity consumption data were collected from both the treatment and reference groups. Informed consent was obtained from the students (verbal) before conducting the sessions and the parents (written) before collecting data.

4. Results

We consider July, August, and September as the pre-intervention period and November, December, and January (2024) as the post-intervention period. Of the 254 students in the treatment group, 67 resided in the hostel within the school boundary, and data collection was not possible (as there is a single electricity meter for the hostel) nor applicable (since they were not living with their families) for them. Of the remaining 187 students, 142 parents agreed to share their data. In the reference group, 134 households agreed to share their electricity-consumption data.

After removing all households with incomplete observations, we were left with 125 households in the treatment group and 124 households in the reference group. To remove further anomalies, we grouped the consumptions by month and winsorized the data at 5- and 95-percentile (separately for treatment and reference groups). Figure 2 shows the trend in average monthly consumption for both the treatment and reference groups.

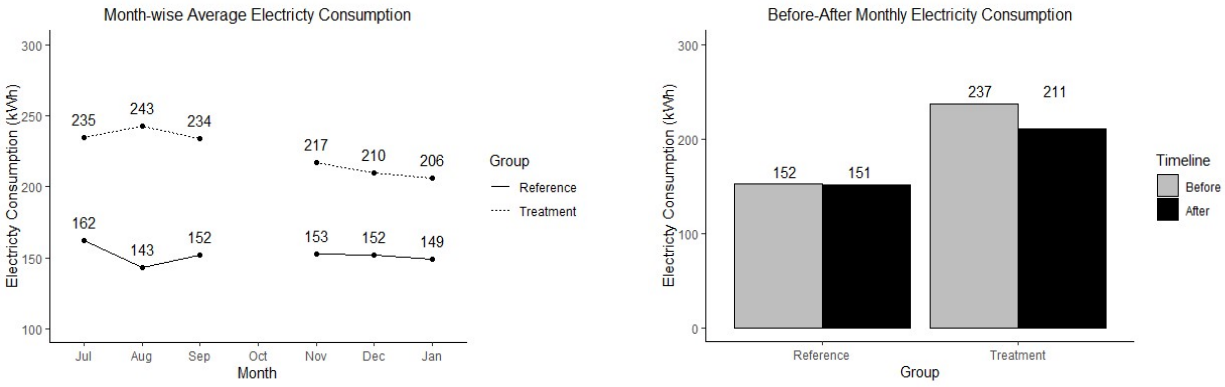

Figure 2. Average monthly electricity consumption of treatment and reference groups.

The survey responses were used to calculate a continuous environmental attitude score (ranging from 1 to 5) for each family in the treatment group. A higher score reflected a stronger pro-environmental attitude. The average score was 3.6, with a standard deviation of 0.49.

It can be seen from Figure 2 that the monthly electricity consumption (both pre- and post-intervention) was much higher for the treatment group than for the reference group. The primary reason for the same is family size; the treatment group mostly had three to five members per family (4.11 per family on average), while the same was 2 to 3 (2.7 per family on average) for the reference group. Model-free analysis (see Figure 2) shows almost negligible weather effects (for the months under consideration) on monthly electricity consumption by the reference group households, while for the treatment group, there has been over a 10% reduction in monthly consumption.

Table 1. Results of pre-post analysis within and between treatment and control groups

	Only within treatment group (Model 1)	**Only within reference group (Model 1)**	**Comparison between two groups (Model 2)**
Post	-0.1123^{***}	-0.0071	
	(0.0167)	(0.0264)	
Treated × Post			-0.1052^{***}
			(0.0313)
Household fixed effect	Yes	Yes	Yes
Month fixed effect	No	No	Yes
No. of observations	750	744	1494
Adjusted R^2	0.94	0.88	0.89

*Note: * p<0.1; ** p<0.05; *** p<0.01*
Standard errors are clustered at household level.

To determine if this reduction is statistically significant, we first perform a pre-post analysis (Model 1) within the treatment group (for the households). E_{it} is the dependent variable capturing electricity consumption by household i for month t. Because of intra-household differences in electricity consumption, obtaining the proportional (%) increase/decrease provides a better idea; hence, we use the logarithm of the dependent variable, $\ln(E_{it})$. The primary dependent variable $Post_t$ takes a value '0' for the pre-intervention months – July, August, and September and '1' for the post-intervention months – November, December, and January. $Household_i$ represents household-level fixed effects to account for unobservable time-invariant household-level characteristics (e.g., income, family size, number of appliances) affecting electricity consumption for a specific household.

$$\ln(E_{it}) = \beta_0 + \beta_1 Post_t + Household_i \quad (1)$$

To check for any generic trend, we performed the same pre-post analysis for the reference group as well. Next, in model 2, we consider both treatment and reference groups together and introduce the variable $Treated_i$ that takes a value of '1' if the household belongs to the treatment group and '0' if it belongs to the reference group. Additionally, $Month_t$ represents the month-fixed effect that accounts for plausible common trends, such as changes in weather.

$$\ln(E_{it}) = \beta_0 + \beta_1 Treated_i + \beta_2 Post_t + \beta_3 Treated_i \times Post_t + Month_t + Household_i \quad (2)$$

Table 1 reports the results from the estimations of Equations (1) and (2). Column 1 shows the pre-post analysis within the treatment group, Column 2 shows the same analysis within the reference group, and Column 3 shows the results when both groups are considered together. Although the econometric setup in Model 2 is similar to the difference-in-difference (DID) analysis, we do not claim it as a DID analysis given that our reference and treatment groups are not interchangeable. Through the comparison in Model 2, we eliminated any weather-specific (or time-varying common

factors) effect from our pre-post analysis for the treatment group. The results of Model 2 clearly showed a statistically significant reduction of 10.5% in the electricity consumption of the treatment group post intervention.

Next, to check the association between a family's environmental attitude and energy consumption, we used survey data collected for the treatment group (as we could conduct the survey only for the treatment group) and found that, on average, households with higher environmental attitudes consume 24.6% less electricity per head (see Appendix Table A1). However, the correlation between environmental attitude and the reduction in average electricity consumption is insignificant[8], suggesting that the intervention worked with equal effectiveness on households irrespective of their environmental attitude before the intervention began.

In fact, the observed reduction in electricity consumption suggests a broader impact of the intervention, potentially reflecting a range of environmentally conscious behaviors. Although electricity consumption is a critical and measurable aspect of a household's propensity towards adopting a sustainable lifestyle, it represents just one facet of the potential behavioral changes induced by the intervention; it is most likely to have spillover effects (Carlsson et al., 2021). The observed reduction in electricity consumption indicates a possible shift towards more sustainable practices, such as reduced waste generation, water conservation, sustainable transportation choices, and similar climate-friendly decisions (Alacevich et al., 2021; Bonan et al., 2024). These changes highlight the potential of educational interventions to foster sustainable habits beyond what is immediately measurable.

Even if one were to consider only the 10.5% reduction in electricity consumption from Model 2, the potential impact could be huge if it were to be scaled up. For example, the Bengaluru city in India has more than 4,000 private schools[9]. If we consider that 50% of those are middle and high schools and, on average, every school has 120 students in each of the 6th, 7th, and 8th grades, this amounts to 720,000 households. Being conservative (since there might be two children studying in 6th–8th grades in some households), we consider 540,000 households (75%). Assuming an average electricity consumption of 200 kWh per month per household, the total reduction in electricity consumption would be 10.8 million kWh per month. Accounting for the average carbon intensity of electricity generation in India (0.82 kg CO_2/kWh), this translates to a minimum of 8.86 million kg of CO_2 emission reduction every month. This too is based on a very conservative estimate, and only for the city of Bangalore alone. When adopted and scaled up across all the schools in the country (or the world), the potential impact of this intervention can be enormous. Besides environmental benefits, it also helps in foreign exchange savings for countries like India, which depend on imports to meet their energy needs, by lowering energy demand and, in turn, reducing import requirements.

5. Discussion and Conclusion

Our proposed intervention aspires to inculcate sustainable behavior among household members using school children as conduits for change. This awareness-based intervention educates schoolchildren about climate change and its consequences so that they realize the need to adopt sustainable lifestyles in their homes. The intervention sensitizes the school children about how their daily activities, such as keeping the lights/fans on or keeping the AC at a much colder temperature, frequent use of washing machine/dryers at less than full loads, wastage of water, and overconsumption of material goods, impact the environment and result in drastic changes in climate, and how climate change can have a serious impact on their wellbeing. The expectation is that the children will discuss the same with their family members, which in turn will make them more conscious of their daily habits, leading to mindful household consumption patterns.

[8] Pearson correlation coefficient of -0.015 with $\text{p value: } 0.87$

[9] D. N. Shree, Bengaluru's public education crisis https://www.deccanherald.com/india/karnataka/bengaluru/bengalurus-public-education-crisis-2653000 - Last accessed on 20 November 2024.

We tested our proposed intervention in one of the well-known private schools in Bengaluru, India. While our intention was to evaluate the effectiveness by measuring various sustainability indicators, practical constraints restricted our data collection to only electricity consumption. Despite this limitation, our findings support our conjectures and offer valuable insights into the intervention's effectiveness. More importantly, owing to its simplicity, the intervention can be easily scaled up by training the teachers in the schools to carry out this intervention, thus providing a critical mechanism to bring about large-scale behavioral changes in communities across the world to reduce further damage to the environment. This is also in line with the experiential learning pedagogy advocated by many countries in the middle and high school curricula. For example, Singapore's Applied Learning Program (ALP) (Ho & Lee, 2022), New Zealand's National Education and Learning Priorities (NELP) (Adamson, 2022), and India's National Education Policy (NEP) (Kumar et al., 2021) were designed to promote real-world phenomena and experience-based learning for schoolchildren.

While behavioral interventions targeting the fast and automatic System 1 thinking process have been common in the literature (Marteau et al., 2012; Dolan et al., 2012), we take the difficult route of targeting the System 2 process, that requires cognitive capacity and where actions are driven by conscious reflection. Voluntary System 2 thinking is much more effective for lasting effects through habit change (Kahneman, 2011), which is imperative for mindful resource consumption in households, especially for cheap and easily available resources, such as electricity. Once the environmentally conscious habits become part of system 1 thinking of households through such interventions, the savings would become automatic and significant. Similar to a previous study on food waste reduction in households through intervention with children (Boulet et al., 2022), we show the possibility of inducing an environment-friendly behavioral change directly among the children and indirectly among their parents and family members. Contrary to the natural difficulty in scaling behavioral interventions (Allcott & Mullainathan, 2010), this intervention can be scaled up within a reasonable time and with limited resources.

The primary limitation of this study was the lack of diverse measurable indicators beyond electricity consumption. Future research should aim to include a broader set of objective measures to capture the multifaceted nature of sustainable behavior more comprehensively. Longitudinal studies would also be beneficial in understanding the long-term effects of such interventions and whether the observed reduction in electricity consumption can be sustained over time.

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Appendix

Appendix A: Questionnaire to gauge family's environmental attitude
Appendix B: Session outline

Unique Project Code (UPC): 60001

- **Please note down your UPC number on the last page of your diary. We will be using this UPC throughout this project with IIMB; so, you need to remember it.**
- **Please mark the most suitable option for the following questions. There is no right or wrong answer; so, mark the most appropriate option based on what you have observed and experienced at your home. This is not an exam, so there are no marks given.**

1. **At your home, how often do you see lights/fans on, when no one is in the room?**
   a) Never b) Rarely c) Sometimes d) Often e) Always
2. **How often do you see the geyser or water heater switched on even after everyone has had their bath?**
   a) Never b) Rarely c) Sometimes d) Often e) Almost everyday
3. **How often do you see that the TV is on, but no one is watching?**
   a) Never b) Rarely c) Sometimes d) Often e) Always
4. **How often do you see the washing machine dryer being used at your home?**
   a) Never b) Once in 10 days c) Once in 7 days d) Once in 3 days e) Everyday
5. **How often do you see someone at your home reusing RO wastewater for cleaning or gardening?**
   a) Never b) Rarely c) Sometimes d) Often e) Always
6. **Do you see water taps running continuously while your parents/siblings are brushing their teeth?**
   a) Never b) Rarely c) Sometimes d) Often e) Always
7. **Do you see water taps running continuously while your parents/maids are cleaning dishes?**
   a) Never b) Rarely c) Sometimes d) Often e) Always
8. **How often do you use public transport (bus/metro/train) while travelling with parents?**
   a) Never b) Rarely c) Sometimes d) Often e) Always
9. **How often do you see your parents/siblings taking stairs, when they have to climb only 1 or 2 floors?**
   a) Never b) Rarely c) Sometimes d) Often e) Always
10. **How often do your parents/siblings use bicycle or walk to nearby places (grocery store etc.)?**
    a) Never b) Rarely c) Sometimes d) Often e) Always
11. **How often do you hear words like "climate change", "environment", and "conservation" at your home?**
    a) Never b) Rarely c) Once in a week d) Once in every 2-3 days e) Almost everyday
12. **Do your parents/siblings watch TV programs or videos about sustainability and environment?**
    a) Never b) Rarely c) Once in a month d) Once in a week e) Once in every 2-3 days
13. **How often do your parents talk to you about climate change and sustainability?**
    a) Never b) Rarely c) Sometimes d) Often e)Always

Session 1

Activity	Duration
Introduction and setting the context	5 minutes
What is global warming? How the global average temperature has changed over the years (Video clip on what is global warming and climate change)	10 minutes
A short video clip on how blue earth has turned red and discussion around it	5 minutes
How climate change is affecting our daily lives How the frequency of catastrophic events has increased over the years	15 minutes
Video clip on rising sea level and its consequences	10 minutes
Asking students about the reasons behind	5 minutes
Suggesting environment-friendly practices	5 minutes
Asking students to - Share their ideas - Discuss with their family about climate change - Watch the videos (shared via email to parents) with their family	5 minutes

Session 2

Activity	Duration
Talking about the last session and what they discussed with family members	5 minutes
Discussion about what sustainable habits they have picked up in past two weeks	15 minutes
Connecting the recently occurred extreme weather events to climate change	10 minutes
Emphasizing on the environment-friendly habits and their benefits	10 minutes
A short clip on living a sustainable lives and discussion around waste reduction	10 minutes
Making students take a pledge to save energy and water, reduce waste, and follow sustainable lifestyle every day	5 minutes

Appendix C: Content of email to parents

Dear Parents,

Greetings from xxxxx (Name of the university)!!!

As you all already know, climate change is severely affecting people across the world. The last decade (2010-2020) was the warmest decade on record. If the Greenhouse Gas (GHG) emissions continue to rise at the current rate leading to increasing temperatures, rising sea levels and melting polar ice, we will face more intense droughts, water scarcity, severe fires, flooding, catastrophic storms and declining biodiversity. Climate change is already affecting our health, ability to grow food, housing, safety and work, and will continue to worsen the quality of life for all future generations.

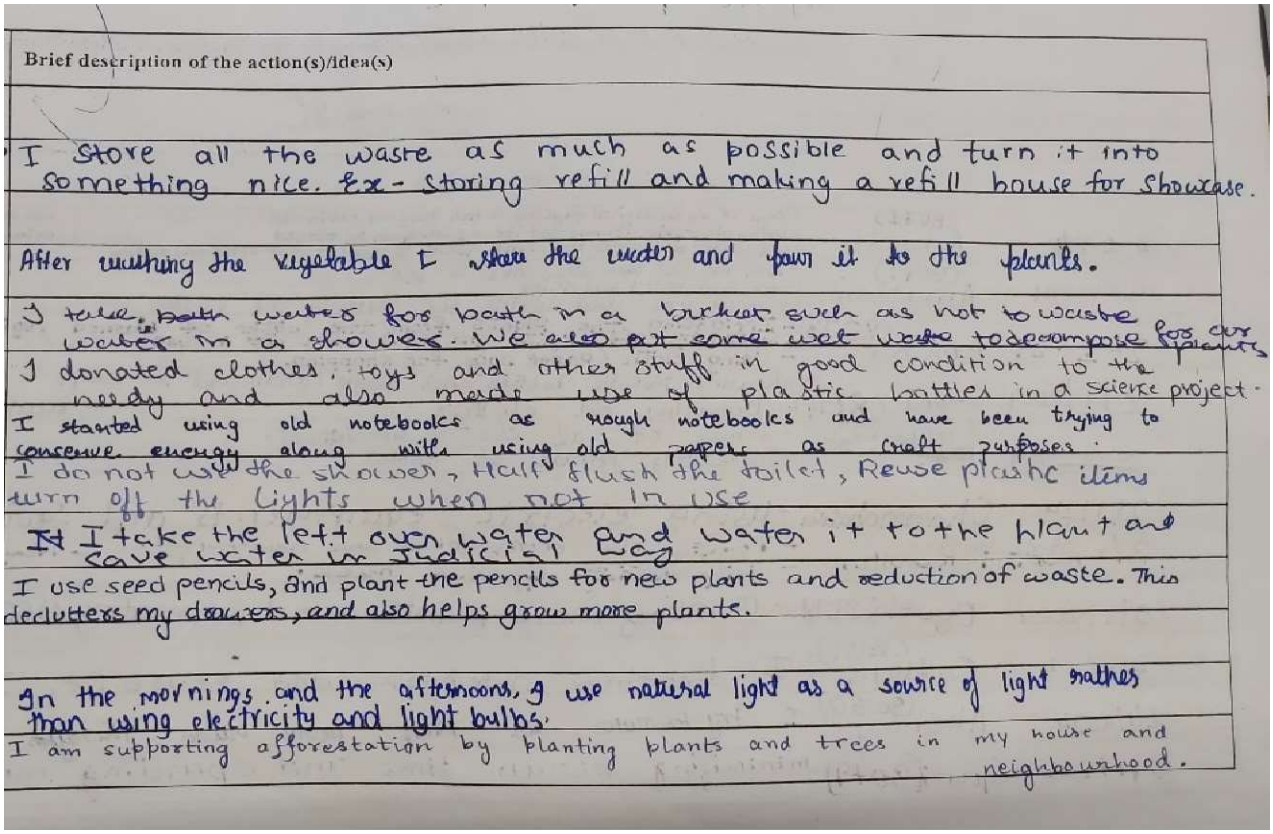
However, it is not all bad news. We already know the solutions to abate climate change, which is to significantly reduce the GHG emissions by adopting alternative energy sources and more sustainable ways of living. It is in this context that we, a team of researchers at (Name of the university) in partnership with xxxxx (School name) are seeking your support. We strongly believe that, if we can create awareness amongst all the children in the world about the need for adopting sustainable habits and lifestyles, they will become the evangelists for sustainable living and change the world for the better. To test this belief, we are carrying out a pilot intervention in the 6th standard students of xxxxx (School name). If we succeed in this pilot study, we plan to roll it out in other schools. We request you to participate in this intervention and help us in identifying scalable solutions to promote sustainable lifestyles in our communities.

The following videos were shown to your wards during the first awareness session. We request you to watch these videos along with your children and clarify any doubts they might have and encourage them to follow the environment-friendly action items we have shared with them.

- What is Climate Change? Explore the Causes of Climate Change
- Global Warming from 1880 to 2022
- Antarctica is losing ice at an accelerating rate

Yours sincerely,
( )

Appendix D: Sample idea sheet from a section of grade Eight



Brief description of the action(s)/idea(s)

I store all the waste as much as possible and turn it into something nice. Ex - storing refill and making a refill house for showcase.

After washing the vegetable I store the water and pour it to the plants.

I take bath water for bath in a bucket such as not to waste water in a shower. We also put some wet waste to decompose for our plants

I donated clothes, toys and other stuff in good condition to the needy and also made use of plastic bottles in a science project.

I started using old notebooks as rough notebooks and have been trying to conserve energy along with using old papers as craft purposes.

I do not use the shower, Half flush the toilet, Reuse plastic items turn off the lights when not in use

I take the left over water and water it to the plant and save water in judicial way

I use seed pencils, and plant the pencils for new plants and reduction of waste. This declutterss my drawers, and also helps grow more plants.

In the mornings and the afternoons, I use natural light as a source of light rather than using electricity and light bulbs.

I am supporting afforestation by planting plants and trees in my house and neighbourhood.

Appendix E: Sample newsletter

November 2023

GREEN GAZETTE

An intervention by IIM Bangalore started with the view that if we create awareness amongst all the children in the world about the need for adopting sustainable habits and lifestyles, they will become the evangelists for sustainable living and change the world for the better.

This month, we highlight (School Name)'s going green and sustainability efforts. Prof. Haritha Saranga, Operations Management, Chair of Sustainability Taskforce at IIM Bangalore along with her team met the students of grade VI & VIII and conducted a sensitization session on October 4, 2023.

The session showcased the results of global warming and climate change, discussed the causes behind the same and highlighted the dire need of living a sustainable life. The students were called to join the movement of saving the planet and advised to make sustainable choices in their daily life, and also educate the family members about the same. Many students from both the grades shared what they did at their home and offered some new ideas that can be adopted.

A few eye-opening statistics about climate change:

- The Earth's average surface temperature has increased by approximately 1.2 degrees Celsius (2.2 degrees Fahrenheit) since the late 19th century
- In 2022, global carbon dioxide (CO_2) emissions were around 37.5 billion metric tons
- Global sea levels have risen about 20 centimeters (8 inches) over the past century and the sea levels are rising at an average rate of 3.4 millimeters per year
- There is an increase in the frequency and intensity of extreme weather events such as hurricanes, heatwaves, floods, and droughts, across the world

WHAT THE STUDENTS WERE ASKED TO DO

- ☐ Switch off lights, fans & geysers after use
- ☐ Keep the AC temperature at minimum 24°C
- ☐ Take the stairs instead of the lift
- ☐ Reduce use of dryer in washing machines
- ☐ Put off the power switches for TVs, ACs, Microwaves, Kettles & other electrical appliances, when not in use
- ☐ Turn off the tap when not in use
- ☐ Use half flush in toilets when possible
- ☐ Reuse wastewater from water-filters
- ☐ Reuse wastewater after washing vegetables
- ☐ Ask parents, maids, cooks, and gardeners not to leave the tap running continuously while washing dishes and vegetables, and watering plants

First page

XXXX(school name) : Std. VI Sec. A

GREEN STAR IDEA

Re-using old newspapers to make grocery carrying bags and small crafts that are usually made of plastics, and also, for making papier-mâché

OTHER GREEN IDEAS FROM VI-A

- Using reusable clothes that are degradable in soil, minimizing the use of polyester clothes as they are made from plastic and plastic cannot degrade in the soil
- Re-using the waste-water that gets collected from the RO water purifier to water the plants and sweep the house
- Donating your old clothes to poor people or giving it to your sibling(s) if they fit in.
- Reducing the use of washing machine by washing a bulk of clothes at one go
- Using edible spoons made of edible items in place of plastic spoons for snacks or small-use purpose
- Using bucket water instead of pipe water for car washing

One page is dedicated to each section

Table A1: Association of environmental attitude and energy consumption

	Only within treatment group
EAScore	-0.2460^{***}
	(0.0592)
Intercept	4.754^{***}
	(0.2152)
No. of observations	690
Adjusted R2	0.023

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

We regress per capita electricity consumption ((denoted by PCE) on the environmental attitude variable (denoted by EAScore) using the following model: $ln(PCE_{it}) = \beta_0 + \beta_1 EAScore_i$