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What Makes Green Persuasion Effective?

Evidence from a Community-Financed Sanitation Program in Indonesia

Hide-Fumi Yokoo* and Tetsuya Harada†

Abstract

Understanding when and where face-to-face communication affects pro-environmental decisions is important for policymakers. We study a data set collected in a solicitation project intended to increase participation in a community-financed waste collection program in Indonesia. Two types of messages are developed and randomly assigned to 748 households. In addition, solicitors are randomly assigned to a control group or one of two treatment groups, and these groups are shuffled further midway through the project. These two orthogonal randomizations allow us to assess the impact of a combination of messages, solicitors and households. We find that the "help the children" message increases the probability of participation for households with a young child. Solicitor personality is associated with immediate participation but becomes nonsignificant after three months. Furthermore, a household is more likely to participate if a solicitor knows the respondent personally. These results suggest that, at least in the short term, important factors in encouraging behavioral changes include not only the contents of messages but also the type of sender of such messages. This paper highlights the possible impact of targeting and content-sender-receiver matching when persuasive communication is used as an environmental policy instrument.

Keywords: Aggregate redistributional effects, Indonesia, Message, Persuasive communication, Randomized field experiment, Sanitation, Waste collection

JEL classification: I15, M37, O13, Q56

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1. Introduction

Policymakers frequently employ normative messages to encourage pro-environmental behaviors (see, e.g., Ferraro and Price, 2013; Ito et al., 2018; Reiss and White, 2008). Glaeser (2014) refers to environmental campaigns or psychological approaches that influence environmental behaviors as green persuasion. Green persuasion messages can be delivered in various ways, such as via flyers, newspapers, radios, phones and emails.

According to Briscoe and Aboud (2012), however, in the context of developing countries, these messages are mostly delivered via face-to-face oral communication. Governments and nongovernmental organizations employ face-to-face communication to encourage, for example, the purification of drinking water (Jalan and Somanathan, 2008), the use of a hygienic latrine (Guiteras et al., 2015), handwashing (Guiteras et al., 2016), and the purchase of energy-efficient lightbulbs (Toledo, 2016). DellaVigna and Gentzkow (2010) review empirical studies on the effects of such messages and argue that the size of the effect is consistently larger under face-to-face encouragement than under other delivery methods.[1]

Understanding when and where persuasive face-to-face communication encourages pro-environmental behaviors is important for policymakers. According to DellaVigna and Gentzkow (2010), the average effect of persuasive communication depends on the quality of messages, the incentives of senders, the prior beliefs of receivers, and the heterogeneity in the population. In addition, unlike in the case of economic incentives, the effect of a message can be negative depending on its content and the beliefs of receivers. Furthermore, the direction and magnitude of the impact of a message may differ depending on the beliefs and characteristics of senders, especially when the message is delivered via face-to-face communication.

In this paper, we study a project conducted in the city of Palembang, Indonesia, with the aim of improving sanitation. Recent studies have shown that the quality of sanitation affects the formation of human capital in developing countries (e.g., Adukia, 2017; Dickinson et al., 2015; Geruso and Spears, 2018). The safe disposal of sewage and solid waste is a basic way of improving sanitation (Somanathan, 2010); however, the coverage of waste collection networks in developing countries is often below the optimal level.[2] In 2017, door-to-door canvassing was conducted to increase participation in a user-pay waste collection program operated by a local community. Community leaders collaborated with us, and detailed data were collected throughout

[1] DellaVigna and Gentzkow (2010) refer to a message provided by one agent (the sender) with at least a potential interest in changing the behavior of another agent (the receiver) as an instance of *persuasive communication*.

[2] Dubin and Navarro (1988) consider waste collection services in the United States to be impure public goods, while Kipperberg and Larson (2012) consider recycling programs in the United States to exhibit features of impure public goods. Thus, the expansion of such services/programs requires the coordination of behaviors and/or policy interventions.

this process. In this project, we designed a randomized field experiment including 748 households to investigate the factors that determine the success of green persuasion.

This experiment exhibits several notable features. First, we developed two types of messages to be used in the context of door-to-door canvassing. One message was a traditional environment-based (ENV) persuasive message using a flyer containing pictures of a garbage pile resulting from illegal disposal. The other message represented a novel "help the children (HTC)" message using flyers containing pictures of young children. Households were randomly assigned to the ENV, HTC or control (C) group. Second, communicators were randomly assigned to these three groups and further shuffled midway through the project, thus allowing us to observe 748 randomly matched sender-receiver-content combinations.[3] This design enables us to estimate not only the average treatment effects of the two types of messages but also their heterogeneous impacts with respect to household characteristics, communicator characteristics, and the relationship between the two (i.e., whether the sender knows the receiver prior to communication). Third, we were able to observe the pro-environmental decisions made by the households—contracting with the collection service (participation in the program)—objectively by using payment information. The contract status of households was observed for longer than one year to examine both immediate and persistent effects. In addition, detailed information related to the face-to-face communication (e.g., the content and duration of conversations) was collected.

From our regression analyses, first, we find that the HTC message weakly increases the probability of participation only for households including a child under the age of ten. This finding demonstrates that encouraging potential participants to consider young children or future generations can encourage households to adopt pro-environmental behavior. In addition, this effect is significant even three months after communication. Second, we find a significant effect of the communicator. Communicator personality is associated with immediate participation, but this effect becomes less significant after three months. Based on our findings, we discuss an efficient way of matching sender-receiver-content while keeping the number of households contacted per communicator constant.

Our study contributes to a small but growing body of literature on methods of encouraging pro-environmental behavior via face-to-face communication (Beltramo et al. 2015; Bennear et al., 2013; Briceño and Chase, 2015; Guiteras et al., 2016; Luoto et al., 2014; Pattanayak et al., 2009a; Pattanayak et al., 2009b; Toledo, 2016). Existing studies estimate the average treatment effects of one or two types of messages; however, no study has examined communicator characteristics. We find that a novel type of message encouraging the receiver to imagine young children living in conditions of poor sanitation has heterogeneous treatment effects with respect to household characteristics. In addition, we conduct additional analyses of the heterogeneity of the effects with

[3] Members of a local community became communicators (senders of the message).

respect to the household-communicator relationship. The results suggest that, at least in the short term, important factors in encouraging behavioral changes include not only the type of message that is sent but also the sender and recipient of the message. This paper highlights the importance of targeting and sender-receiver-content matching when face-to-face communication is used as an environmental policy instrument.

The remainder of this paper is organized as follows. Section 2 provides background information regarding the experiment. Section 3 describes the experimental design and data. Section 4 presents the results of the analyses. Section 5 investigates in further detail the factors affecting the success of persuasive communication, focusing on the heterogeneity of receivers and senders. Section 6 discusses the limitations of this study. Section 7 concludes.

2. Setting

[Figure 1]

This study was conducted in the northern part of the Talang Kelapa ward (*kelurahan*) of Palembang city in the South Sumatra province of Indonesia (Figure 1). The ward is divided into northern and southern parts. The northern part consists of 16 neighborhood associations (*rukun tetangga: RT*) (see Figure A1 in the Online Appendix). These 16 neighborhood associations include 1,642 households and 8,210 residents. Within these neighborhood associations, however, only one public waste collection point exists at the northern edge, where waste collection trucks contracted by the municipality stop to collect waste. Members of households located at the greatest distance from this waste collection point must walk for more than 10 minutes to reach it, and such a situation is common in Indonesia. For more details regarding municipal waste management in Indonesia, see the Indonesia Infrastructure Initiative (2013).[4]

Consequently, the illegal dumping and open burning of waste remain prevalent. In response to deteriorating public health, the government of Indonesia has begun to encourage community-managed waste collection programs using so-called TPS-3R facilities.[5] While central/local

[4] For more detailed information on community-based waste management in Indonesia, see Kubota et al. (2020) and Sekito et al. (2019). Pasang et al. (2007) introduce another concept, "*neighborhood-based* waste management," to refer to the existing practice in Indonesia. Moreover, they distinguish it from *community-based* waste management and compare the two models. Throughout this paper, however, we use the term "community-based" or "community-financed" to describe the practice of solid waste management in Indonesia that is operated by neighborhood associations.

[5] TPS-3R stands for Tempat Pengelolaan Sampah-3R (Reduce, Reuse, and Recycle). Such waste treatment facilities typically feature large open spaces and roofed buildings as well as crushing machines for composting and shifting machines for vehicles/motorcycles. Local communities are expected to manage their own waste management activities, including collecting waste, sorting recyclable waste, and composting. For more details concerning this policy, see Regulation No. 3/PRT/M/2013 of the Ministry of Public Works and Housing of Indonesia.

governments provide these facilities with supplemental equipment, such as three-wheeled vehicles, for waste collection, voluntary community groups provide the actual waste collection services for residents in local communities. Organized groups are allowed to collect fees from each beneficiary household to finance the program.

This policy can be interpreted as the provision of public services by local residents via their own contribution. This situation is different from the customs of developed countries, in which formal private markets for waste collection exist (e.g., in the United States) or central/local governments finance and provide such services using their tax revenue (e.g., in Japan). Olken and Singhal (2011) refer to this type of policy in developing countries as *informal taxation* since governments impose an implicit tax on local residents in the form of labor and/or in-kind contributions.

According to the Ministry of Public Works and Housing in Indonesia, 468 TPS-3R facilities were located in Indonesia nationwide in 2014.[6] Approximately half of these facilities, however, were said to be out of operation, typically because leading community groups were unable to raise sufficient revenue to continue their activities. It is often difficult to determine a sufficient fee in negotiations with residents and to increase the number of participating households. Due to this difficulty, from 2013 to 2017, Japan International Cooperation Agency (JICA) assisted central/local governments in developing and expanding community-financed waste management programs using the TPR-3R model.[7] Palembang city was one of two pilot sites supported by the project.

The Talang Kelapa ward was selected as our research setting for the following reasons. In 2014, the municipal government of Palembang installed waste collection facilities modeled on TPS-3R at four locations throughout the city.[8] The northern part of Talang Kelapa was one of these locations. A voluntarily organized group began to operate a waste collection program using the TPS-3R facility in 2016. Although the program initially enrolled approximately 100 households rather quickly, it subsequently struggled to expand the participation rate. The operating group consisted of approximately 10 residents of the ward. The group hired workers to collect waste from beneficiary households, which paid a monthly fee of 20,000 Indonesian rupiah each to receive the collection service.[9]

[6] This figure only refers to facilities constructed with the use of funding from the central government. Some facilities are constructed by local governments and have their own budgets. Thus, the number of such facilities might exceed this figure.

[7] In the context of the Project for Capacity Development of Central and Local Governments for 3R and Domestic Solid Waste Management Systems.

[8] These four sites were chosen after vetting community leaders and members who were able to operate the service. The government of Palembang encouraged community leaders to operate the service, and the communities accepted the invitation.

[9] Twenty thousand Indonesian rupiah was equal to approximately 1.48 US dollars in January 2017. This amount is approximately equivalent to the purchase of one or two local lunches.

At the end of December 2016, 166 out of 1,642 households participated in the program. The remaining households either carried their waste to the collection point themselves, dumped it illegally or burned it, or paid informal waste collectors to collect it. Through the end of 2016, the operating group increased the number of participating households via personal solicitation or word of mouth. However, the group planned to increase its customer base. We supported the group and proposed systematic door-to-door solicitation to increase the number of participants. Eight neighborhood associations featuring low participation rates were targeted.[10] Twelve members of the operating group and two temporary staff members conducted door-to-door solicitations from February to April 2017.

3. Experimental design and data

3.1 Treatments

Solicitations were conducted by two-person teams that used a prepared flyer and based their verbal approach on the relevant script. Figure A2 in the Online Appendix displays the flyer's top side, which introduces and outlines the waste collection service and provides contact details for inquiries/applications (telephone number, email address, and social networking service (SNS) accounts), as well as some photographs.

The English version of the script starts on page 6 of the Online Appendix. First, the solicitor asked whether the respondent had previously heard of the program. Following this opening, the solicitor explained that the organic waste collected is composted, thereby reducing residual waste,[11] and that waste is collected daily six times a week excluding Sundays. Furthermore, this script conveyed messages inspired by previous studies on strategies for the voluntary provision of public goods. For example, an artefactual field experiment in Bolivia conducted by Jack and Recalde (2015) investigates whether leadership, for example, encourages the voluntary provision of public goods. Drawing from their conclusions, we included the following in the script: "*Our members include two leaders of neighborhood associations …*" Moreover, several randomized field experiments have found evidence that mentioning the previous contributions of many others induces new contributions (e.g., List and Lucking-Reiley, 2002). In line with these recommendations, we included the following in our script: "*Right now, we have 166 households.*"[12] The solicitor finally mentioned the monthly fee of 20,000 Indonesian rupiah.

[10] Each neighborhood association (RT) was numbered. The targeted neighborhood associations were RT 20, 25, 27, 52, 61, 62, 77, and 79.

[11] As described separately, community members on the operations side of the service also managed "waste banks," which are common services in Indonesia and Thailand that offer waste collection and the resale of recycled waste. These services are amply introduced and differentiated from this project in the script. The group of community members operating the services is referred to as "KSM" based on the abbreviation in the Indonesian language.

[12] Furthermore, the voluntary provision of public goods is easier to encourage when threshold public goods are involved (Rondeau, Poe and Schulze, 2005). In line with this observation, we inserted the following into our script: "*Our dream is to expand our customers up to 500 households within Talang Kelapa.*"

The content we have described thus far (i.e., the scripts on pages 6 and 7 and Figure A2 in the Online Appendix) was employed in all solicitations. Households that were exposed only to the material already mentioned were designated the control group. Additionally, we formulated the following two approaches to persuasive communication. First, the following message was added to the end of the script aimed at the control group: "*Your participation will keep the environment clean and help the government of Palembang city reduce solid waste thrown in the TPA (final waste processing site).*" This message was further amplified by the following: "*If we continue littering, our community will become messy and the environment will suffer. It may even result in floods. Also, burning waste is not good for the environment. It generates smoke and affects our health.*" Furthermore, four photographs depicting environmental pollution appeared on the flyer's backside, as shown in Online Appendix Figure A3. The main caption was as follows: "*Save the environment by changing your habits.*" Households exposed to this expanded script and flyer were designated as treatment group 1 (the ENV treatment group).

Regarding the second type of persuasive communication, the script targeting the control group was augmented with the following message: "*Imagine the future of our children. For their future, let us keep our environment clean and healthy. Let us contribute to producing compost and reducing solid waste. Let us create a waste-less community for our children. Help the children by changing your habits.*" Four photographs also appeared on the backside of this flyer, as shown in Online Appendix Figure A4. Two of these photographs showed young children, and two photographs depicted environmental pollution.[13] The main caption was as follows: "*Help the children by changing your habits."* Households exposed to this amended script and flyer were designated as treatment group 2 (the HTC treatment group). Notably, recent research has demonstrated that imagining future generations and adopting their perspective foster the voluntary provision of public goods (Kamijo et al., 2017).

3.2 Sample construction and experimental design

A survey conducted by the operating group with our help in late December 2016 noted 794 separate residential dwelling units in the eight neighborhood associations under study.[14] These 794 dwellings were defined as the unit of randomization for the experiment. In the preliminary survey, the visible attributes of dwellings (the number of stories, automobile ownership, the presence of a parking lot, and the presence of an air conditioner) were observed externally. The 794 dwellings were then randomly divided into three groups: the control group, which was

[13] One of these photographs was also included among the four photographs used in the ENV treatment. The other photograph depicting environmental pollution showed the final waste-processing site in Palembang. A similar photograph including a hazy background was used in the ENV treatment, while the photograph used in the HTC treatment featured a sunny background.

[14] However, some of these dwellings were expected to be vacant. Hence, prior to the actual implementation of the solicitation project, the exact number of inhabitants was unknown.

exposed only to standard communications, the ENV treatment group, and the HTC treatment group.

Ten community members from the operating group served as solicitors. Additionally, two temporary workers each were hired for the first and second phases of the project.[15] These 12 solicitors were organized into six two-person teams for each phase of the solicitation project. Solicitation featured one of these teams visiting each dwelling. Considering previous evidence concerning the influence of solicitors' personal attributes (e.g., Landry et al., 2006), the six teams were randomly formed from this pool of 12 solicitors. These six randomly matched two-person teams were then randomly assigned to the control group, ENV group, or HTC group. Furthermore, the logistics concerning which dwellings were visited by which team and which of the two solicitors in each team took the lead role during solicitation were also determined randomly. Consequently, the roles of the main solicitor and subsolicitor for each team were clearly defined. Furthermore, the solicitation project was divided into two phases, including a first phase in February 2017 and a second phase in April 2017. The team members were shuffled between these two phases. In other words, the composition of the six two-member teams during the first phase differed from the composition of the teams during the second phase. Team members were randomly matched, conditional on each member being paired with a different partner in the second phase. The six new teams formed in this manner were then randomly assigned to the three groups (C, ENV, or HTC).

3.3 Data

Four data sets were merged for the regression analysis of persuasive communication. The first data set consisted of the previously mentioned dwelling data collected prior to solicitation, while the second consisted of the solicitation outcomes. Households enrolling in the program contacted the subscription desk to initiate the service. Once per month, they paid a fee to the collection staff or members of the operating group. These payments were recorded in a notebook by accounting staff who were members of the operating group. These written records, including subscribers' names, addresses, neighborhood association numbers, and house numbers, were digitized. Each monthly payment was thus recorded. From these data, a month during which a household was subscribed and the fee was paid was assigned a dummy variable taking the value of one, which was designated as the dependent variable in our main analyses.

The third data set contained information on the solicitors. As mentioned previously, since solicitors' personal attributes were expected to influence the outcomes, solicitors were interviewed prior to the solicitations to control for such influences. The questionnaire used for solicitors and surveyors is shown in Online Appendix C. In addition to their basic attributes, previous occupational experience as marketers or solicitors, previous solicitations for this

[15] That is, four temporary workers were hired in total.

program and their actual results were collected on a self-reported basis. Furthermore, following the example of Landry et al. (2006), the solicitors' height and weight as well as five personality assessment characteristics (assertiveness, sociability, sense of self-efficacy, drive to achieve, and self-confidence) were collected.[16]

The fourth data set resulted from observations of each solicitation. Each two-person team was accompanied by a hired worker who was required to be present during each solicitation. This worker was referred to as the "surveyor." The surveyor accompanied the solicitation team and, depending on the situation, also entered the house of the family being solicited. However, the surveyor rarely said a word throughout the solicitation and functioned essentially as an observer by partially recording her or his observations from start to finish.[17] Additional characteristics of the household were recorded, including characteristics related to whether a respondent was the household head, the gender of the respondent, the number of children in the household, and the number of children in the household aged 10 years or younger.[18] The surveyor also recorded whether the respondent and the community members-turned-solicitors knew each other, the time and duration of the solicitation, and whether various components of the prepared script related to persuasive communication were employed during the solicitation.

[Figure 2]

Although 794 dwellings were targeted during this solicitation project, it became evident during the solicitation period that 5.5% of these dwellings were unoccupied. Hence, the modified sample contained 748 households. Furthermore, although these 748 households were visited, 15.9% of them were unavailable or declined the solicitation, leaving 629 households that were actually solicited. However, solicitation was not a prerequisite for subscribing to the program. Hence, even among the 119 households that were not solicited, some households subsequently enrolled in the program and paid the relevant fees between February and August 2017. Figure 2 shows the timeline of the door-to-door solicitation project between December 2016 and July 2017. This figure also reports the number of sample households solicited during each phase.

Furthermore, some households enrolled in the program but terminated their participation shortly thereafter (14% of households that subscribed during the month of solicitation). Conversely, some households that did not enroll immediately after solicitation joined the program during the following month or by the third month after solicitation (approximately 20% of the households). Therefore, two variables representing subscription data for the month of solicitation and for the

[16] Moreover, the laboratory experimental game developed by Engelmann and Strobel (2004) was employed to elicit social preferences via a hypothetical survey, and individuals were thereby classified in accordance with their preferences with respect to self-interest, inequality aversion, and social welfare (Charness and Rabin, 2002). However, we do not use the results of this analysis in this paper.

[17] The survey and check sheet for solicitations used for this purpose appear in the Online Appendix D.

[18] In Sections 4.2 and 4.4, we explain in further detail how we collected and supplemented information related to household characteristics.

period three months after solicitation (i.e., May for solicitations in February and July for solicitations in April) were analyzed as outcome variables. In this study, the impact of the persuasive communication approach in the former (latter) case was designated the short-term (long-term) effect of this approach.

4. Main results

4.1 Summary statistics

[Figure 3]

Figure 3 plots the time series of the number of participants in the program. Following the solicitations in February and April 2017, the number of participating households increased to 350 by May 2017. Although this analysis is just a simple before-after comparison, it shows that the implementation of the solicitation project increased the number of participants.

[Table 1]

Table 1 presents the summary statistics of the baseline survey of dwellings receiving each treatment. The variables are balanced across the control and treatment groups, thus verifying the randomization. In general, houses featuring two stories, a parking lot, an automobile, and an air conditioner are considered to be relatively wealthy households. In the following analysis, we develop a wealth index using these variables.

4.2 Average treatment effects of the messages

Using the following model, we evaluate the average treatment effect of the content of persuasive communication in the ENV and HTC treatments on payment for the waste collection service:

$$y_{iik} = \alpha + \beta_1 ENV_i + \beta_2 HTC_i + \tau_j + \sigma_k + \epsilon_{ijk}, \quad (1)$$

where y_{ijk} is a dummy variable taking the value of one if household i living in RT j that was solicited by main solicitor k joined the program and paid the fee during the month of solicitation and zero otherwise. ENV_i is a dummy variable taking the value of one when household i received the ENV treatment, and HTC_i is a dummy variable taking the value of one when the household received the HTC treatment. The model includes RT (τ_j) and solicitor (σ_k) dummy variables. We estimate a linear probability model.[19]

[Table 2]

Table 2 reports the results concerning the impact of persuasive communication on participation in the program. Column (1) shows the results for all households, including households that

[19] All results are similar if we instead use a binary model. See the Online Appendix E for detailed results.

rejected solicitation. This result shows the intention to treat (ITT) estimates of the two types of content. Column (2) presents the result only for solicited households. As shown in Columns (1) and (2), no significant effects of the two persuasive communication tools are found.

To understand the types of households that are more likely to participate in the program, we add three variables related to household characteristics to Equation (1). The first variable is the wealth index of household *i*. The four dummy variables in Table 1 are used. For each variable, we subtract the mean and divide by the standard deviation. We then take the average across the four variables and interpret this variable to refer to the household's level of wealth. The second variable is a dummy variable taking the value of one if the household currently has a contract with a waste collector in the informal sector. Due to the low level of coverage of public waste collection services in Indonesia, informal markets have emerged to provide waste collection services by transporting garbage from households to public waste collection points. This variable is collected via observations of conversations between solicitors and respondents during the solicitation. The surveyor of each team deduced this variable from information obtained during the solicitation. The third variable is a dummy variable taking the value of one if the household includes a young child. Since one of the treatments involves a message related to young children, we are interested in this characteristic of households. This variable was collected during the solicitation and complemented by interviews with the leaders of each neighborhood association.

Columns (3)-(6) in Table 2 report the results including these three household characteristics. The results of the analyses show that wealthier households are more likely to participate in the program. If households already have a contract with an informal waste collector, they are less likely to participate in the program. Finally, if the respondents live with a child younger than 10, they are more likely to participate in the program. We interpret this result as indicating that households living with a child of this age are reluctant to bring garbage to the collection point because the opportunity cost is relatively high due to the requirements of rearing young children. Thus, households with young children tend to demand the waste collection service.

[Table 3]

To examine the long-term effects of the message contents and the stability of the relationship between the demand for the service and household characteristics, we estimate the model for another dependent variable: participation three months after solicitation. Table 3 reports the results. For the ENV treatment, once again, we observe no significant ITT. For the HTC treatment, most specifications show no significant effect, while Columns (4) and (6) show negative and significant effects. In this table, we report the results of the multiple hypothesis testing procedure developed by Westfall and Young (1993), which includes the null hypothesis that all treatment effects in the equation are zero. We find randomization-*t* *p*-values of 0.077 (Column (4)) and 0.094 (Column (6)), meaning that the negative effect is significant even when we adjust the *p*-

values for multiple hypothesis testing. However, we need to be careful when interpreting this result since we lack some observations related to whether the respondent has a "contract with an informal collector." Thus, the sample size of the two models is smaller than 629, which may affect the result. Note that household characteristics are persistently associated with participation rates (Columns (4)-(6) in Table 3).

4.3 Effects of sender characteristics

To examine the effect of the characteristics of solicitors, we regress the following equation:

$$y_{iik} = \alpha + \beta_1 ENV_i + \beta_2 HTC_i + \tau_j + \gamma' X_k + \epsilon_{ijk}, \quad (2)$$

where X_k is a vector of the characteristic variables of the main solicitor.

[Table 4]

Table 4 presents the results when the solicitor's characteristic variables are included. Columns (1)-(3) report the results for participation during the month of solicitation. The coefficients of the main solicitor's body mass index (BMI) are negative for the models reported in Columns (1) and (3). This result is in line with the findings of Landry et al. (2006). Solicitors with more experience as marketers or solicitors exhibit significant success in causing respondents to subscribe. The variable for previous solicitation performance can partly control for the unobserved skills of solicitors in persuading respondents. The estimated coefficient of this variable is positive and significant. The assertiveness and performance motivation of the solicitor are positively associated with the probability of respondent participation, while the sociability of the solicitor is negatively associated with respondent participation. The signs of the coefficients of the four personality variables with one exception are consistent with Landry et al. (2006); the coefficient of assertiveness shows the opposite result. These results suggest that variation in the personality of solicitors partly explains the rates of participation in the program. Overall, the results imply that to encourage the provision of public goods via communication, it is important to consider not only how to solicit but also who solicits.

Columns (4)-(6) in Table 4 present the results concerning the time point three months after solicitation. Compared to Columns (1)-(3), the correlations among the participation rate and BMI, previous solicitation performance, assertiveness, sociability, and performance motivation become nonsignificant. This comparison suggests that although the main solicitor's characteristics affect the participation rate just after solicitation, this effect does not persist over time. However, Columns (4) and (6) indicate the long-lasting and positive effects of solicitors with more experience as marketers.

4.4 Effects of characteristics of the sender-receiver relationship

Subsequently, we are interested in a match-specific variable. Recall that we surveyed whether solicitors knew each household personally prior to the solicitation project. Since most solicitors live in the Talang Kelapa ward and operate the program, it could be the case that the solicitor

knew the residents even prior to the project. In accordance with the survey of solicitors, we create a dummy variable taking the value of one if solicitor *j* knew respondent household *i* prior to the project: φ_{ik}.

To examine the effect of this match-specific variable, we regress the following equation:

$$y_{iik} = \alpha + \beta_1 ENV_i + \beta_2 HTC_i + \beta_3 \varphi_{ik} + \tau_j + \epsilon_{ijk}. \quad (3)$$

[Table 5]

Table 5 reports the results. When solicitors already knew household members, participation rates increase significantly. The magnitude of this effect is large: This effect increases the probability of participation by approximately 18 percentage points (Columns (1) and (2) in Table 5). This finding provides insights into the importance of the solicitation being conducted by a familiar individual to increase participation rates. Interestingly, this positive effect persists even after three months, although it diminishes to 13 percentage points (Columns (3) and (4) in Table 5). In summary, matching the sender and receiver of messages affects the overall outcomes of persuasive communication with respect to encouraging pro-environmental decisions.

5. Additional analyses

We conduct additional analyses to investigate the factors affecting the success of face-to-face persuasion. We test two hypotheses to determine methods of effectively encouraging pro-environmental decisions.

First, we investigate the possibility that all the messages have no effect on all households. Is there any group of households affected by the messages? Since the HTC message pertains to the future of children, it is possible that its effect is different for households with young children and those without. To examine this possibility, we investigate the heterogeneity of the treatment effects of the content of the messages between households with and without a young child.

Second, it is possible that the messages change the behavior of the solicitors. It may be the case that messages intended to change the behavior of households do not reach the households for reasons related to the solicitors. One possibility is that the treatment messages may affect the solicitor's motivation.

5.1 Heterogeneous treatment effects

Considering the heterogeneity of each household, we estimate the model including the interaction terms. Specifically, we estimate the following:

$$\begin{aligned} y_{ijk} = \alpha + \beta_1 ENV_i + \beta_2 HTC_i + \beta_3 ENV_i \times Younger10_i + \beta_4 HTC_i \times Younger10_i \\ + \beta_5 Younger10_i + \tau_j + \sigma_k + \epsilon_{ijk}, \end{aligned} \quad (4)$$

where $Younger10_i$ is a dummy variable indicating whether a respondent lives with a child younger than 10.

[Table 6]

Table 6 reports the results. In this table, we compute *p*-values based on the randomization inference procedure developed by Young (2019) for individual treatment effects. We also report the results of multiple hypothesis testing using the procedure developed by Westfall and Young (1993), which features the null hypothesis that all treatment effects in the equation are zero. The results show that the interaction term with the HTC treatment is positive and weakly statistically significant, although this result may be a consequence of multiple hypothesis testing.[20] This table provides us with suggestive evidence that the HTC treatment may have heterogeneous effects.

Recall that the average treatment effect shown in previous tables is negligible or slightly negative. The HTC coefficients in Table 6 are also negative (although three out of four coefficients are not significant). These results suggest that the HTC treatment decreases the probability of participation for households that do not include children under the age of 10, but this negative effect is offset if the household includes children under the age of 10. From these results, we can reasonably conclude that the content of the HTC may have opposite effects for these two types of households and that the results indicate no effect on average is the consequence of a composition of these opposing effects.

This finding suggests that persuasive communication can have a positive or negative impact depending on the respondents' characteristics, implying that improving solicitors' ability to vary their approach to solicitation in accordance with their observations of the respondents (e.g., by using casual conversation to develop an understanding of the respondents' characteristics) could increase the participation rate. Overall, these results suggest the possibility that different persuasive communication techniques are required for different households or that persuasive communication should be used only for particular subjects.

5.2 Treatment effects on solicitors

In the solicitation project, we advised the solicitation teams to visit a house repeatedly if the resident was absent during the first visit. We asked the solicitors to visit a house more than three times if a respondent was absent. As a result of this requirement, 12.4% of the sample was categorized as "not at home at the time of solicitation (absent)."

[20] Based on the result of the Westfall–Young multiple hypothesis testing procedure, we cannot reject the null hypothesis that all treatment effects are zero (*p*-values are 0.218 and 0.162 for Columns (1) and (3), respectively).

The variable "Absent" seems to be exogenous for solicitors; however, this may not be the case. That is, if a solicitor is highly motivated, she or he may visit a house repeatedly or change the time of day that the visits take place until she or he is able to meet the respondent. It is not impossible for such solicitors to meet a family in the same community.

Note that solicitors were also randomly assigned to the three types of messages. That is, if the presence or absence of households is not associated with the motivations and behaviors of the solicitor, then "Absent" and the type of message should also be uncorrelated with each other.

[Table 7]

Table 7 reports the results of analyses in which we change the dependent variable used in Equation (1) to other variables that describe various aspects of the solicitation process. Column (1) shows the average treatment effect of the content of persuasive communication on reports of absent respondents. The results show that the ENV treatment significantly increases the number of households recorded as "Absent." This treatment increases the probability of "Absent" households by approximately 11.8 percentage points compared to the control group. In contrast, the HTC treatment decreases "Absent" households by 8.7 percentage points. These results suggest that some associations exist between the contents and reports of absent households.

Column (2) reports the effects on a similar but slightly different dependent variable: "Solicited." This variable takes the value of one if a solicitor successfully solicited a targeted household. The variable takes the value of zero if a solicitor determined that the household was absent. In addition, 20 households (2.7% of sample households) rejected the solicitation and are coded as zero. Moreover, 0.8% of sample households were mistakenly visited by a team that was assigned to a different treatment group. These households are also coded as zero. The results show that the ENV treatment significantly decreases the probability of the completion of solicitation by 13.0 percentage points. Once again, the coefficient of the HTC treatment in this column shows the opposite sign but is not statistically significant.

Was the flyer handed out to a sample household? Columns (3) and (4) report the results of the analysis when the dependent variable is changed to "Flyer was provided." Column (3) reports the result for all households in the sample, whereas Column (4) reports the results for solicited households only. The results show that compared to the control group, both the ENV and HTC treatments significantly decrease the probability that the flyer was provided to a household. The magnitude of these effects is large. The ENV treatment decreases the probability that the "Flyer was provided" by 23.3 percentage points, whereas the HTC treatment decreases it by 33.1 percentage points conditional on the completion of solicitation.

Why does the ENV treatment decrease the probability of solicitation? Soliciting via the ENV treatment may not be very motivating for or may even discourage solicitors. Since the script is

relatively long (see the Online Appendix B), the ENV treatment may increase the time required for solicitation. Column (5) reports the causal effects of both the ENV and HTC treatments on the length of time spent on solicitation conditional on the event that solicitation was conducted. The results show that both treatments significantly increase this value, thus suggesting that these treatments are time consuming or even redundant. Overall, Table 7 reports evidence suggesting that these two treatments affect the behavior of solicitors.

6. Discussion

The results in the tables displayed above are highly robust to an alternative model. All the results are qualitatively similar even when using the logit models. See Appendix Tables in the Online Appendix E for details.

However, we must be careful when drawing conclusions regarding the external validity of this study. Several points of caution are worth noting. First, this study is a case study of a single community in one city in Indonesia. In addition, the specificity of the experimental setting suggests caution. The community at our study site may be unique in terms of intrinsic motivation. To investigate the uniqueness of our community, we conducted surveys in several Indonesian cities. Specifically, we conducted interviews with 56 communities that employ the TPS-3R model. The results of the interview surveys show that many community-operated waste collection programs based on the TPS-3R model have failed to continue operations. Approximately half of these programs have ceased operations. Furthermore, in Palembang, six TPS-3R sites were operating in 2014. However, as of 2016, only one site was continuing to operate in the community targeted by this study. One could say that an exceptional volunteer spirit may exist in the community that we studied. On a related note, the presence of TPS-3R operational leaders in the community is somewhat different from the practice in Indonesia. Overall, we admit that this case study was conducted in a relatively extraordinary setting that is fortunate to have such community leaders. To corroborate the external validity of the results of this experiment, similar studies are needed.

Second, the methodology of this study merits caution. Each two-person solicitation team involved in this study was accompanied by a surveyor. Moreover, the support of the donor was advertised by a logo displayed on the flyer. In other words, several slightly different elements set this project apart from ordinary solicitation campaigns implemented solely by local communities. Although it would be difficult to quantitatively assess the influence of these factors, we cannot reject the possibility that some unintended effects exist, including a Hawthorne effect.

Third, we need to consider the possibility of spillover effects involving the treatments used in this study. One possible explanation for the lack of an average treatment effect of either of the

treatments could be a spillover from one treatment to another group. For example, a household in the control group may be affected by neighbors who were solicited as part of the HTC or ENV groups. This effect could confound the treatment groups with the control group, thus leading to an underestimation of the true impact of the treatments.

7. Conclusion

Using data from a field experiment conducted in a community in Indonesia, this paper examines the factors affecting the success of face-to-face communication intended to encourage pro-environmental behaviors. We find that both the traditional environment-based message and the new "help the children" message do not, on average, affect the decisions of our sample households to participate in a waste collection program.

From our additional analyses, we find that the ENV message is likely to increase the rate of failure of door-to-door solicitations due to the absence of approached households. One possible interpretation of this result is that this message may undermine the intrinsic motivation of solicitors to solicit. We also show evidence supporting the claim that this message increased the time required for solicitation. Note that, according to previous studies, normative messages may occasionally cause the recipient to feel uncomfortable (Allcott and Kessler, 2019). In a small community such as the setting of this study, solicitors may avoid communicating a lengthy and depressing message to potential participants who live in the same community. If the senders of a message hesitate to deliver it, the message will have no significant effects in a field setting even if it is shown to be effective in the context of a laboratory or hypothetical survey.

Another finding from the experiment is that a relationship between the sender and the receiver of the message prior to the solicitation affects the results of solicitation. This finding implies that reallocating solicitors may improve performance with respect to environmental persuasion. Note that environmental campaign managers often face human resource (i.e., solicitors or marketers) constraints in terms of both quantity and quality. Therefore, future work should develop an efficient rule for assigning solicitors and messages to account for the distribution of household characteristics while keeping the content of messages and the solicitors involved unchanged. Relatedly, Graham, Imbens, and Ridder (2014) present a framework of econometric methods for measuring the effect of reallocation with respect to an indivisible input.[21] Rigorously evaluating reallocation policies is an interesting avenue for future research.

[21] Graham, Imbens, and Ridder (2014) refer to the average causal effects of such policies reallocating indivisible resources as *aggregate redistributional effects*.

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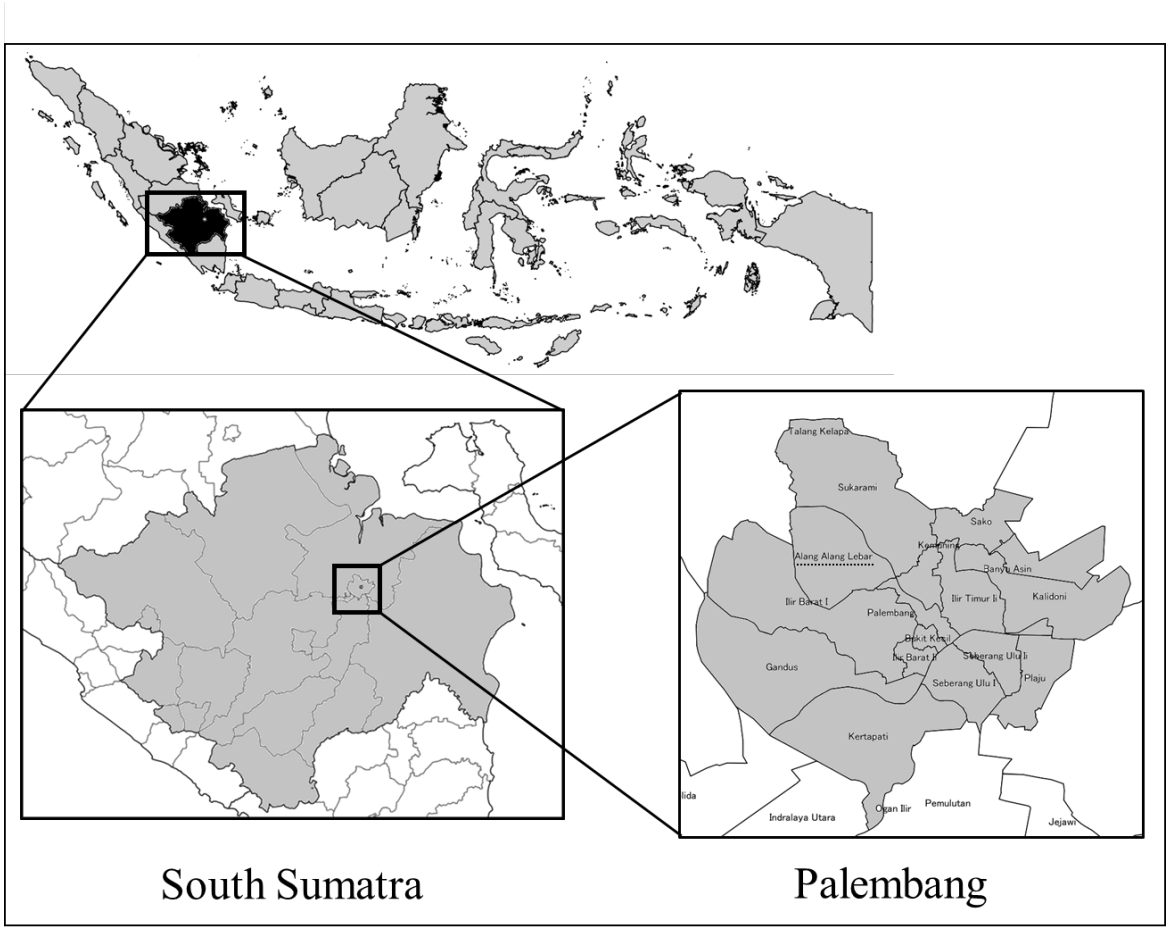

Figure 1: Map of the research site

Notes: This figure shows maps of Indonesia, South Sumatra and the city of Palembang. The research site is located at Alang-Alang Leber, which is emphasized via a dotted underline.

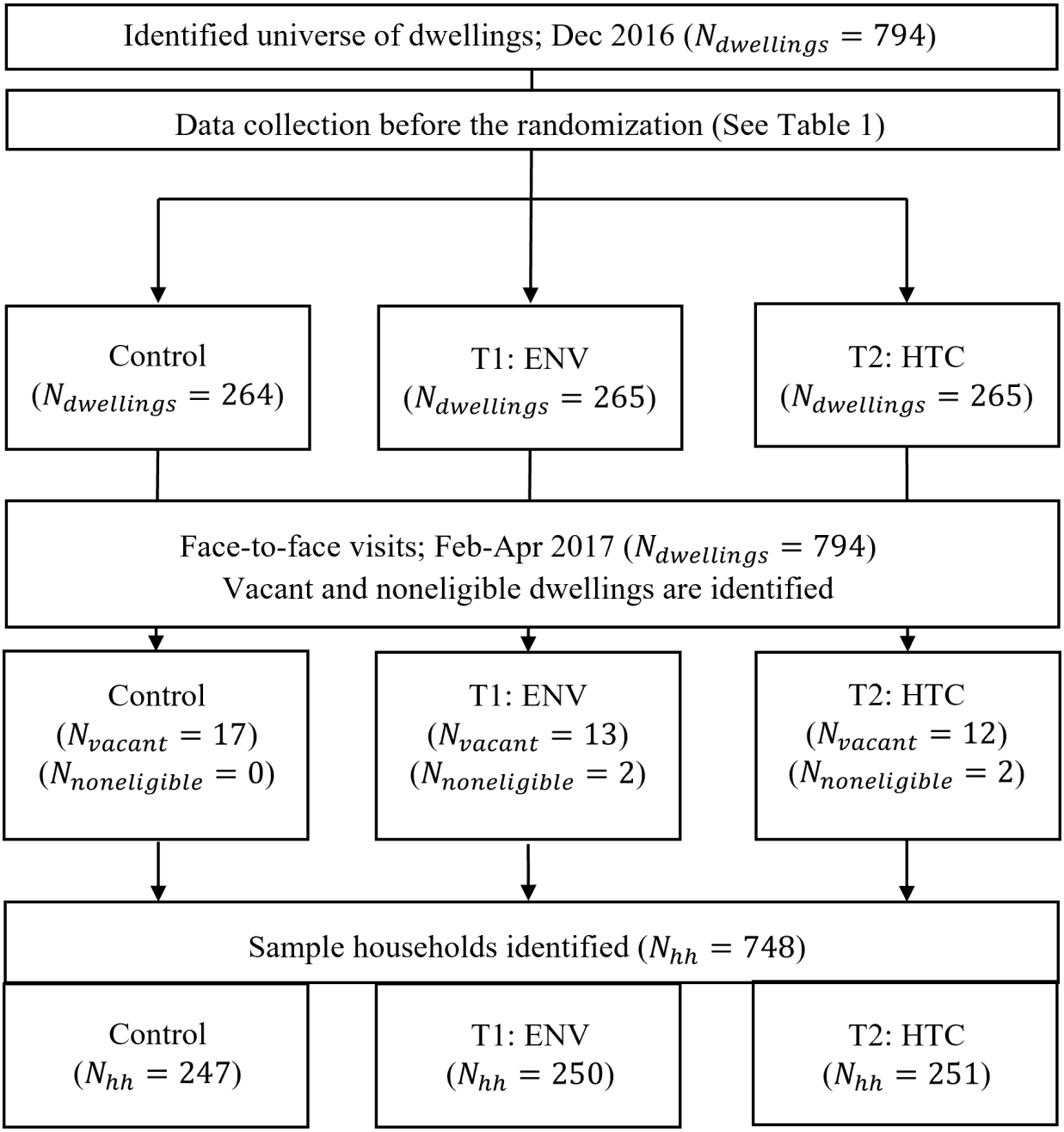

Figure 2: Timeline of the door-to-door solicitation project

Notes: This figure shows the timeline of the door-to-door solicitation project implemented from December 2016 to July 2017.

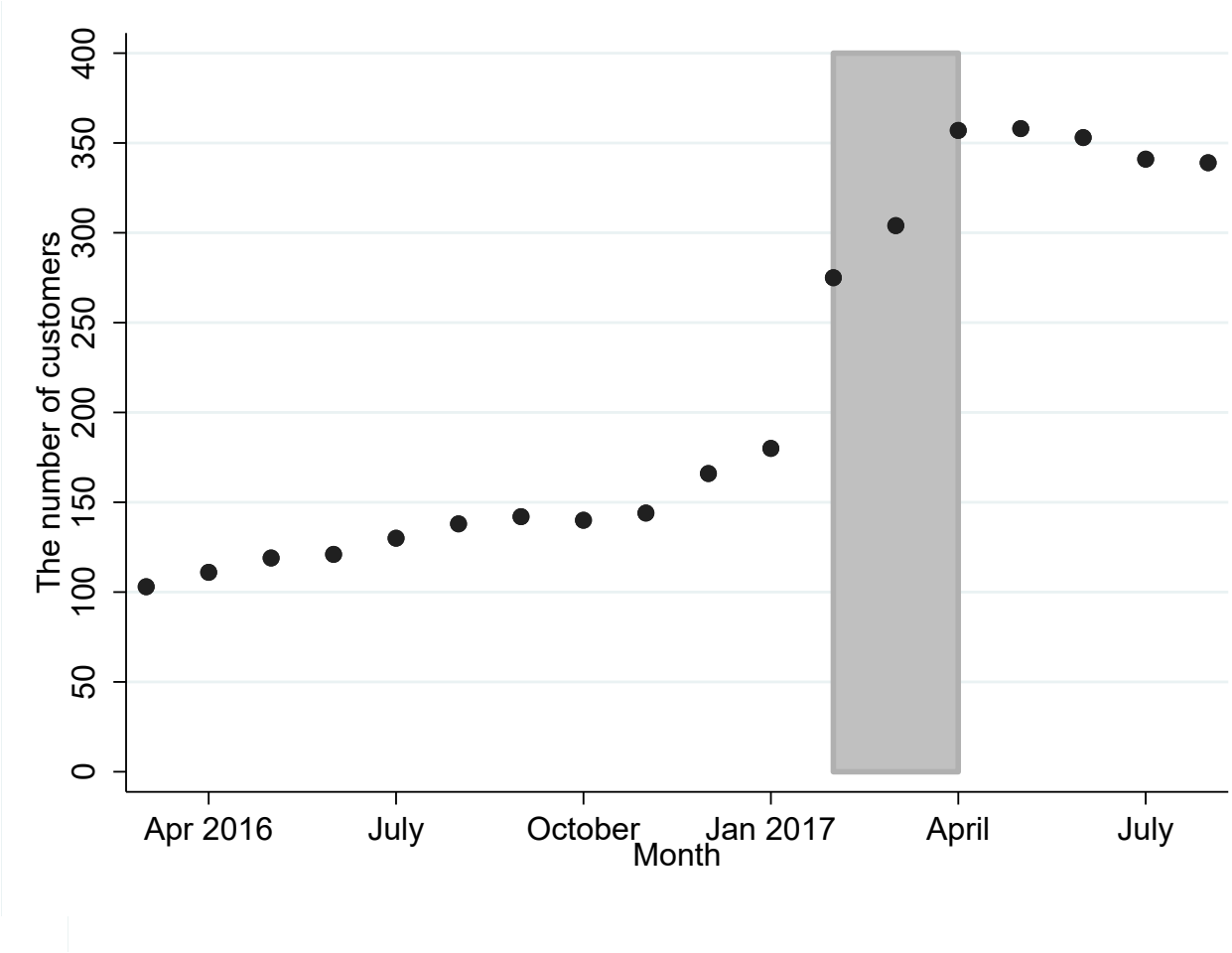

Figure 3: The number of participants

Notes: This figure shows the number of subscribers to the program over time. The shaded area indicates the period during which the solicitation project was implemented.

Table 1: Balance test

	(1)	(2)	(3)	(4)	(5)
				Difference	
	Control	*T1 ENV*	*T2 HTC*	*p-value*	
				C vs. T1	*C vs. T2*
Dwelling characteristics collected prior to randomization					
Number of floors in the house	1.102	1.091	1.122	0.649	0.481
	(0.304)	(0.288)	(0.328)		
Has an automobile (= 1 if yes)	0.330	0.355	0.293	0.543	0.363
	(0.471)	(0.479)	(0.456)		
Has a parking lot (= 1 if yes)	0.500	0.506	0.460	0.897	0.360
	(0.501)	(0.501)	(0.499)		
Has an air conditioner (= 1 if yes)	0.274	0.294	0.247	0.601	0.488
	(0.447)	(0.457)	(0.432)		

Table 2: Effects of the two messages and household characteristics: Linear probability models

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable:	Contract during the month of solicitation					
Sample:	All households (HHs)	Solicited HHs only				
Save the environment (*ENV*)	-0.001	0.020	0.017	0.002	0.006	-0.015
	(0.036)	(0.044)	(0.044)	(0.040)	(0.043)	(0.038)
Help the children (*HTC*)	0.021	0.017	0.021	-0.039	0.015	-0.038
	(0.042)	(0.044)	(0.044)	(0.041)	(0.045)	(0.039)
Wealth index			0.019			0.043**
			(0.018)			(0.017)
Contract with an informal collector				-0.328***		-0.339***
				(0.040)		(0.039)
HH includes a child younger than 10					0.083***	0.103***
					(0.031)	(0.028)
Constant	0.316***	0.327***	0.326***	0.529***	0.296***	0.492***
	(0.043)	(0.046)	(0.047)	(0.062)	(0.046)	(0.062)
Solicitor dummy variable	YES	YES	YES	YES	YES	YES
RT dummy variable	YES	YES	YES	YES	YES	YES
Observations	748	629	627	605	614	597
R-squared	0.056	0.059	0.059	0.203	0.071	0.227

Notes: The coefficients of the linear probability models and standard errors are reported. Standard errors are clustered at the RT-solicitor level. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 3: Effects of the two messages and household characteristics three months after the solicitation

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable:	Contract three months after the month of solicitation					
Sample:	All households (HHs)	Solicited HHs only				
Save the environment (*ENV*)	0.005	0.028	0.024	0.014	0.021	-0.001
	(0.033)	(0.037)	(0.036)	(0.038)	(0.037)	(0.036)
Help the children (*HTC*)	-0.023	-0.032	-0.025	-0.083**	-0.034	-0.078*
	(0.041)	(0.041)	(0.041)	(0.040)	(0.042)	(0.039)
Wealth index			0.032			0.057***
			(0.022)			(0.021)
Contract with an informal collector				-0.283***		-0.295***
				(0.040)		(0.039)
HH includes a child younger than 10					0.070**	0.091**
					(0.035)	(0.036)
Constant	0.347***	0.357***	0.355***	0.531***	0.330***	0.498***
	(0.034)	(0.034)	(0.036)	(0.050)	(0.036)	(0.051)
Solicitor dummy variable	YES	YES	YES	YES	YES	YES
RT dummy variable	YES	YES	YES	YES	YES	YES
Westfall–Young multiple hypothesis testing	0.794	0.655	0.728	0.077	0.642	0.094
Observations	748	629	627	605	614	597
R-squared	0.041	0.041	0.044	0.148	0.050	0.169

Notes: The coefficients of the linear probability models and standard errors are reported. Standard errors are clustered at the RT-solicitor level. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. The *Westfall–Young multiple hypothesis testing* row reports the randomization-*t* *p*-values for the multiple hypothesis testing procedure based on the randomization inference procedure developed by Westfall and Young (1993). It tests the null hypothesis that all treatment effects in each equation (each column) are zero.

Table 4: Effects of solicitor characteristics: Linear probability models

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable:	Solicited month			Three months later		
Save the environment (*ENV*)	0.007	0.019	0.031	0.022	0.008	0.017
	(0.044)	(0.044)	(0.039)	(0.037)	(0.034)	(0.034)
Help the children (*HTC*)	-0.016	-0.003	0.048	-0.042	-0.011	-0.019
	(0.039)	(0.035)	(0.046)	(0.040)	(0.038)	(0.040)
Age of the solicitor	0.002	0.002	-0.000	0.002	0.000	-0.000
	(0.002)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)
BMI	-0.010		-0.018**	-0.004		-0.011
	(0.006)		(0.008)	(0.005)		(0.007)
Has experience as a marketer or	0.068**		0.090**	0.080**		0.103**
solicitor	(0.032)		(0.036)	(0.031)		(0.042)
Previous solicitation performance	0.001		0.007***	-0.001		0.002
	(0.002)		(0.002)	(0.002)		(0.002)
Assertiveness		0.020**	0.042***		0.013	0.014
		(0.010)	(0.013)		(0.011)	(0.018)
Sociability		-0.006	-0.026*		-0.001	-0.017
		(0.010)	(0.013)		(0.011)	(0.013)
Self-efficacy		0.020	0.012		-0.006	-0.016
		(0.018)	(0.016)		(0.013)	(0.015)
Performance motivation		0.026	0.042**		0.015	0.017
		(0.017)	(0.016)		(0.018)	(0.021)
Self-confidence		-0.028	-0.021		-0.005	0.015
		(0.019)	(0.016)		(0.016)	(0.024)
RT dummy variable	YES	YES	YES	YES	YES	YES
Observations	629	629	629	629	629	629
R-squared	0.030	0.031	0.047	0.032	0.026	0.037

Notes: The coefficients of the linear probability models and standard errors are reported. Standard errors are clustered at the RT-solicitor level. Constant terms are not reported. RT dummy variables are controlled. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 5: Effects of the sender-receiver relationship:
Linear probability models

	(1)	(2)	(3)	(4)
Dependent variable:	Solicited month		Three months later	
Save the environment (*ENV*)	0.010	0.026	0.021	0.014
	(0.041)	(0.035)	(0.035)	(0.031)
Help the children (*HTC*)	0.021	0.048	-0.025	-0.016
	(0.042)	(0.044)	(0.041)	(0.040)
Solicitor knows the respondent	0.176***	0.180***	0.125***	0.126***
(= 1 if yes)	(0.044)	(0.043)	(0.044)	(0.041)
Constant	0.176***	0.372*	0.241***	0.428**
	(0.052)	(0.190)	(0.042)	(0.182)
HH wealth index	YES	YES	YES	YES
HH includes a child younger than 10	YES	YES	YES	YES
Solicitor dummy	YES	NO	YES	NO
Other solicitor characteristics	NO	YES	NO	YES
RT dummy variable	YES	YES	YES	YES
Observations	613	613	613	613
R-squared	0.099	0.091	0.067	0.065

Notes: The coefficients of the linear probability models and standard errors are reported. Standard errors are clustered at the RT-solicitor level. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table 6: Heterogeneity in treatment effects: Linear probability models

	(1)	(2)	(3)	(4)
Dependent variable:	Solicited month		Three months later	
Save the environment (*ENV*)	-0.044	-0.043	0.011	-0.004
	(0.053)	(0.048)	(0.059)	(0.055)
	[0.406]	[0.369]	[0.845]	[0.949]
Help the children (*HTC*)	-0.046	-0.020	-0.108*	-0.095
	(0.060)	(0.059)	(0.060)	(0.058)
	[0.444]	[0.727]	[0.077]	[0.108]
HH includes a child younger than	0.015	0.010	0.017	0.018
10 (= 1 if yes) [R10]	(0.045)	(0.045)	(0.048)	(0.047)
ENV × R10	0.097	0.115	0.022	0.027
	(0.075)	(0.074)	(0.086)	(0.084)
	[0.208]	[0.135]	[0.799]	[0.751]
HTC × R10	0.123*	0.130*	0.148*	0.144*
	(0.072)	(0.072)	(0.075)	(0.074)
	[0.089]	[0.072]	[0.052]	[0.055]
Constant	0.322***	0.428**	0.349***	0.495**
	(0.047)	(0.204)	(0.039)	(0.192)
HH wealth index	YES	YES	YES	YES
Solicitor dummy variable	YES	NO	YES	NO
Solicitor characteristics	NO	YES	NO	YES
RT dummy variable	YES	YES	YES	YES
Westfall–Young multiple hypothesis testing	0.252	0.208	0.154	0.161
Observations	613	613	613	613
R-squared	0.077	0.067	0.060	0.057

Notes: The coefficients of the linear probability models and standard errors are reported. Standard errors are clustered at the RT-solicitor level. The randomization-*t p*-values based on the randomization inference procedure developed by Young (2019) in brackets. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively. The *Westfall–Young multiple hypothesis testing* row reports the randomization-*t p*-values for the multiple hypothesis testing procedure based on the randomization inference procedure developed by Westfall and Young (1993). It tests the null hypothesis that all treatment effects in each equation (each column) are zero.

Table 7: Effects of the two messages on the length of time required for solicitation

	(1)	(2)	(3)	(4)	(5)
Dependent variable:	Absent	Solicited	Flyer was provided		Length
Sample:	All HHs	All HHs	All HHs	Solicited	All HHs
Save the environment (*ENV*)	0.118***	-0.130***	-0.280***	-0.232***	1.585***
	(0.034)	(0.041)	(0.038)	(0.042)	(0.354)
Help the children (*HTC*)	-0.087**	0.066	-0.249***	-0.331***	1.032**
	(0.038)	(0.043)	(0.047)	(0.043)	(0.437)
Constant	-0.013	1.015***	1.013***	1.011***	6.395***
	(0.042)	(0.045)	(0.044)	(0.023)	(0.300)
Solicitor dummy variable	YES	YES	YES	YES	YES
RT dummy variable	YES	YES	YES	YES	YES
Observations	748	748	748	629	628
R-squared	0.091	0.091	0.199	0.275	0.195

Notes: The coefficients and standard errors are reported. Standard errors are clustered at the RT-solicitor level. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Abstract (in Japanese)

要　約

対面でのコミュニケーションが、いつ、どのような状況で環境問題に関する意思決定に影響を与えるかを理解することが政策立案者にとって重要である。我々はインドネシアのコミュニティが資金面を担う廃棄物収集プログラムに関し、その参加世帯を増やすことを目的とした勧誘プロジェクトにおけるデータセットを研究した。2 種類の勧誘メッセージが作成され、748 世帯に無作為に割り当てられた。さらに、勧誘員も、比較対照群または 2 つの処置群のいずれかに無作為に割り当てられ、さらに、勧誘員の 3 群への割り当てをプロジェクトの途中でシャッフルされた。この直交する 2 つの無作為化により、勧誘メッセージの種類、勧誘員、勧誘対象世帯の組み合わせがプログラム参加に与える影響を評価することができた。分析の結果、「子どもを助けよう」というメッセージは、幼い子どものいる世帯の参加確率を高めることがわかった。勧誘員の性格タイプが勧誘直後には参加を促す効果が見られたが、3 ヶ月後には有意でなくなった。また、勧誘員が対象世帯を元から個人的に知っている場合、その世帯はより参加する傾向にあった。これらの結果は、少なくとも短期的には、メッセージの内容だけでなく、メッセージの送り手のタイプも、受け手の行動変容に影響を及ぼす重要な要因であることを示唆している。本稿は、環境政策の手段として、コミュニケーションによる説得を用いる場合、ターゲティングの仕方、およびメッセージ内容・送り手・受け手のマッチングが与える潜在的な効果を明らかにしている。

キーワード：集計された再分配効果、インドネシア、メッセージ、説得的コミュニケーション、ランダム化フィールド実験、衛生、廃棄物収集

JEL コード：I15、M37、O13、Q56