

Do People Invest in Local Public Goods with Long-Term Benefits?

Experimental Evidence from a Shanty Town in Peru

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Abstract

This paper discusses voluntary contributions to health education in a shanty town in Peru, using a new experimental setup to identify voluntary contributions to local public goods. The experiment enables individuals to contribute to a health education meeting, which will only continue if the cumulative investment level exceeds a certain threshold value. Individuals contributed a substantial amount of money, despite the long-term nature of the health benefits of health education. High discount rates only seem to have had a detrimental effect on investment in a poorer subsample. Results from a complementary experiment, to identify donations to a nutrition program, suggest that positive beliefs about short-term learning benefits of health education have played an important role in the investment decision.

Keywords. Health education, Field Experiment, Time Preferences, Public Good, Peru

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1. Introduction

Ultimate recipients of aid often do not receive a straight gift of money. Instead, money is often turned into public services, like schools, hospitals, roads etc. Lately, however, other types of local public goods have been initiated, wherein NGO donor agencies put efforts in mobilizing and empowering village communities to solve their own problems (Swidler and Watkins, 2009). We follow Swidler and Watkins (2009) in labelling these public goods with a participatory component as NGO services with commitment to sustainability. Until now, these services have been valued with help of contingent valuation methods (Borghi and Jan, 2008). It is, however, unclear whether respondents would actually contribute to NGO services with commitment to sustainability, if they have free-riding opportunities.

Public good games could be used to see whether people with free-riding opportunities actually contribute to NGO services with commitment to sustainability, if the contents of the local public good are added to the description of the game (see Cardenas, 2004 for an example of a public good game with a different public good). For public goods which cannot be provided in part, the threshold public good game could identify voluntary contributions to public goods. In this game, a public good of pre-determined size is provided only if the sum of contributions equals or exceeds a certain threshold (Rondeau et al., 1999).

Although the public good game integrates revealed preferences in the investment decision, it only includes monetary gains for participants, which does not fit well with the type of local public goods that ultimate aid recipients normally receive. It is therefore unclear whether field referents can overcome confusion in this game, which could result in loss of control at a basic level (Harrison and List, 2004). Moreover, benefits from NGO services with commitment to sustainability usually only occur in the long run. Excluding incentives related to time preferences could result in an overestimate of investment levels in public goods with long-term benefits. Individual discount rates are generally higher for the poor (e.g. Carvalho,

2008; Tanaka et al, 2006), and the exclusion of these incentives could therefore result in an even larger upward bias in developing countries. Time preferences, however, usually play a limited role in the public good game.

We propose an experimental setup that can be changed depending on the contents of the local public good and contains both revealed preferences and incentives related to time preferences, to identify voluntary contributions to local public goods. Rather than investing in a common pool of money, participants are asked to contribute to a local public good distributed by an NGO, to avoid confusion and loss of control at a basic level. The participants are informed that the local public good will only be distributed if the cumulative sum of investment of participants exceeds a certain threshold value, like in the threshold public good game. By using this mechanism, contributions of participants determine the continuation of the NGO service.

By conducting the experiment for health education, we were able to identify voluntary contributions to a local public good with long-term benefits and commitment to sustainability. Besides decisional value, non-decisional value of knowledge is also included in local public goods with commitment to sustainability, such as health education. This non-decisional value includes a decrease in concern and an entertainment value, the joy of learning (Borghi and Jan, 2008). Moreover, participation in provision of public goods could lead to higher satisfaction, even if actual decisions do not change. Introducing representative-based meetings in Indonesia did not result in changes in actual decisions, but satisfaction among villagers increased dramatically (Olken, 2008). By identifying donations to the *Vaso de Leche* (VdL) program to finance distribution of milk to children of school-going age simultaneously, we were able to distinguish factors influencing contributions to local public goods with long-term benefits and commitment to sustainability (health education) from factors influencing contributions to programs with long-term benefits, but without a participatory component

(VdL). In this way, we could identify the relative importance of the non-decisional value of health education in the investment decision.

Our field experiments were conducted in a shanty town of Lima in Peru, with participants for whom survey baseline data were available. In this way we were able to relate individual and household level characteristics with voluntary contributions. With our experiments we in fact return to the sort of field experiments as they were carried out in the early days. The way we designed our experiments shows a clear resemblance with the classic paper of Bohm (1972), wherein willingness to pay for a television show was estimated.

Our main contribution consists of the design of a new experimental setup to identify voluntary contributions to local public goods. Besides, we contribute to the small but fast growing literature on combining survey data with field experiments. The principal objective of our analysis is to see whether and to what extent people voluntarily contribute to local public goods with long-term health benefits, such as health education. In our data analysis, we show particular interest in the effect of time preferences and individual beliefs about short-term benefits of health education on individual investment levels in health education.

We observe that people are willing to contribute a positive and substantial amount of money to health education. More than 50% of the available money was invested. Although our small experiment provides only a first indication, we argue that it seems premature, if not unwarranted, to assume that giving money directly to aid beneficiaries can never result in investments in local public goods with long-term benefits. The result stands in stark contrast with the idea among aid distributors that “the poor, especially the poorest are unlikely to access reproductive health education and services without the incentives of immediate benefit” (MFS and UNDP, 2006, p.15). Although donations to VdL are significantly lower, people also seem to be willing to donate a substantial positive amount of money to the VdL program, despite the long-term nature of the community benefits.

Time preferences, however, seem to play a role, but only for the relatively poor in the shanty town. Both investment in health education and donations to VdL are significantly lower for participants with high discount rates, but only if participants' households have a below-median consumption level. The short-term non-decisional value of health education could partially explain the lower voluntary contributions to VdL. Positive significant relationships between individual beliefs about short-term benefits of participation in community meetings and a dummy variable that is one for higher voluntary contributions to health education than to VdL provide support for this claim. In the remainder of this paper we also discuss a number of possible complementary interpretations of our results.

The remainder is structured as follows. First, we describe the field experiment. Hereafter, we describe and analyze the results of the field experiment, followed by possible interpretations. We finalize our paper with a discussion.

2. The Field Experiment

2.1 Background Information

Participants in the experiment were selected from a baseline survey we carried out one year prior to the experiment among 400 households consisting of 1719 individuals in Villa El Salvador; a shanty town of Lima in Peru. Villa El Salvador emerged from households relocated from invaded lands destined for residential houses. After its first ten years, Villa El Salvador was recognized as a legal municipality with 300,000 inhabitants. Data from 2005 show that 17.9% of the households in Villa El Salvador obtained water from cistern-trucks (INEI, 2005). This percentage is 81% in our survey area; Lomo de Corvina. Piped water is often unavailable in Lomo de Corvina, while 76% (INEI, 2005) of the households in Villa El Salvador and 27% of the households in Lima (WSP, 2004) obtained private piped water in 2005 and 2004 respectively. The percentage in our sample that obtained water from cistern

trucks is closer to the percentage of the very poor in Villa El Salvador, whom obtained access to water from cistern trucks in 61.8% of the cases in 2005 (INEI, 2005). Arguably, access to public services in Lomo de Corvina is lower, because it is a more recently invaded area of Villa El Salvador. Forty percent of the children under 5 years old in our sample had suffered from diarrhoea in the last year. In such an environment, preventive behaviour (e.g. improved hygiene practices such as hand washing) can be an important strategy to improve health. Health education is one of the strategies that NGO's use to encourage preventive behaviour. Although health benefits from health education are long-term and uncertain, it could be an effective strategy in an environment such as Villa El Salvador.

2.2 Experimental design

We conducted our experiment in a primary school in Villa El Salvador. From our database (excluding persons living far away from the primary school), we selected 163 persons at random and invited them for the experiment.¹ We only invited one person per household.² In a formal letter, we stated that the participants would receive ten Peruvian soles³ for their participation in a meeting in which their opinion would be requested, with an opportunity to gain additional money during the meeting. The median daily income per household member in our sample is equal to 7.5 soles, which is 75% of the participation fee of 10 soles. To gain their trust, participants were invited by the same persons that carried out the survey in 2007. The surveyors presented and explained a formal invitation letter personally, and came back

¹ Two respondents per household answered questions about attitudes in our survey. Only these persons were invited for our experiment. Generally, the household head and his/her spouse answered these questions, but whenever these persons were not available, other adult persons in the same household from the same gender replaced them.

² We were not able to prevent 1 household to participate with 2 persons in the experiment. All results are robust to exclusion of these subjects from our analysis.

³ At the time of the experiment \$1 was equal to 3,23 soles.

several times when the person invited was not present at the time of the first visit. Invited persons were asked to confirm their participation by a signature. Persons that had doubts about participating were informed about the possibility to decide about participation on the spot. The experiment was organized on a Sunday, because observations made clear that church attendance on Sunday was generally low, which gave us the impression that participation rates would be maximized on a Sunday.

Out of the 163 selected persons, we were able to invite 108 persons personally (67%), 13 persons (8%) had moved and 42 persons (26%) were not found at their home. Forty participants were invited for a morning session of the experiment, and 68 participants were invited for an afternoon session. The experiments were scheduled shortly after each other, to prevent communication between the two groups. Out of the 108 persons invited, 50 (46%) showed up for the experiment. The morning session counted 16 participants, while the afternoon session counted 34 participants. The low turnout is not likely to present a potential bias, although we can not entirely disregard this possibility.⁴ Persons invited were informed they had been selected to participate in an important community meeting regarding health. They were, however, not informed about the exact subject of the meeting: education on hygiene practices in relation to water use.

During the experiment participants were first updated about an NGO's demand for fundraising to a Dutch organization, to organize a health education meeting in Villa El Salvador. They were informed that this health education meeting would be organised in the

⁴ We estimated differences in observable characteristics between participants and non-participants in the experiment. We find few differences in socio-economic characteristics. Consumption and wealth do not differ significantly between the two groups. Women are overrepresented in the experiment, while Catholics are underrepresented. Men in participating households less frequently report to wash their hands after going to the toilet, while women in participating households reported more frequently to wash their hands after going to the toilet, as well as before cooking. Diarrhea occurrence in the last year was lower for experimental subjects.

week after the experiment, in the same primary school where the experiment was conducted. Thereafter, participants were informed that the NGO would only receive money to organize the health education meeting, if the people from Villa El Salvador would show interest in the program. Subsequently, they were told that the NGO decided to organize the current meeting, to identify the degree of interest in the health education meeting. Thereafter, participants were informed about a simple game, wherein they could participate. Next, participants were informed that the health education meeting would be about personal water use to prevent and treat diarrhoea. This was followed by the announcement that two million children die from diarrhoea every year, to inform the participants about the seriousness of the issue. It was also mentioned that 40% of the children of 5 years and younger and 20% of the adults in Lomo de Corvina had suffered from diarrhoea in the last year. Finally, it was reported that health education, in combination with nutritional supplements, had led to a reduction of diarrhoea by 20% among children below five in Mexico (Gertler and Boyce, 2001). Although this might be considered as framing, we believe it adds to the realism of the experiment. Providing beneficiaries with information about the importance of their projects is very common among NGO's and could result in more realistic contribution rates in our experiment.

After having received a participation fee of ten soles, participants were led to a central hall in the school. In the central hall, participants were given four envelopes (green, yellow, blue and pink), two for the choice on health education and two for the allocation to VdL, and two times 20 soles of play money similar to dollars but with the text "Villa El Salvador Un Nuevo Sol". Each envelope contained the first and last name of the participant as recorded from the survey. Participants were given the choice whether and how much of their 20 soles they would invest in the health education meeting. Participants in the morning session were informed that the health education meeting would continue, if 100 soles were collected in total. In the afternoon session, the collective price of health education was adjusted to the

number of participants and was set to 200 soles. Contrary to a classic field experiment in which willingness to pay for a television show was estimated, we also would have let people pay if we would not have collected enough money for the continuation of the health education meeting. In the experiment to estimate the willingness to pay for a television show the goal was to estimate the willingness to pay for the television show controlled for free rider behaviour (Bohm, 1972). The goal of our experiment was, however, to see whether contributions to health education are high even when there is a possibility that the money is lost when others do not contribute enough. To allow for a comparison, contributions to a different good in the form of the VdL program were also requested. The VdL program is a State-organised national program, but is run at the local level by women in their community. The program channels milk to children and pregnant mothers (Clark and Laurie, 2000). Just as in the first experiment, participants were given the choice whether and how much of their 20 soles they would invest in VdL. Contrary to the first experiment, however, participants were told that all their donations would be transferred to the VdL program. No threshold was introduced in this experiment.

It was explained that the play money the participants kept would be exchanged for real soles after the game in a private room. To prevent wealth effects, the decisions in the two experiments were made simultaneously. It was explained that only for one of both decisions participants were allowed to keep the money they did not invest, and that we would toss a coin in a private room to decide for which one of the decisions the participants were allowed to keep the money. A number of examples were given and a number of questions were asked, to make sure that the participants understood the experiment. After the instruction the participants were told to put the money in the appropriate envelopes. Envelopes were used to guarantee private decision making during the experiment and were empty before the start of it. Participants put all the money in the appropriate envelope, which suggests that participants

understood the procedure. During the private exchange of play money for soles, participants who were not occupied with exchanging money were asked to fill out a small questionnaire.

3. Results

3.1 Investment in health education and VdL

Experimental subjects contributed substantial shares of their endowment to health education in our experiment. Although only 6.25 soles and 5.88 soles were needed for realization of the health education meeting in the morning session and the afternoon session respectively and free-riding was an option, subjects donated on average 10.8 soles to ensure the organization of the health education meeting. None of the subjects showed complete free-rider behaviour, since the lowest contribution to health education was 3 soles. There were two subjects that donated the maximum amount of 20 soles to the continuation of the health education meeting. There were no significant differences in investment in health education between experimental subjects in the morning session and experimental subjects in the afternoon session ($z=0.91$, $P=0.36$). Although contribution levels are slightly concentrated at the mean and right-skewed, a normal distribution of the density plot cannot be rejected ($\chi^2=2.827$, $P=0.24$). Figure 1 shows the distribution of voluntary contributions to health education.

The contributions to health education are significantly different from 0, and even a contribution of 9 soles to health education falls outside the 95% confidence interval of investment in health education (9.61-11.98 soles). This result stands in stark contrast with views from aid distributors. Beforehand, the NGO with whom we cooperated did not believe that experimental subjects would make any significant contribution to health education.

The high investment level in health education does not stand on its own. Donations to VdL were 8.64 soles on average. Only one participant abstained from donations to VdL. A normal distribution of the density plot of donations to VdL cannot be rejected ($\chi^2=2.108$, $P=0.35$). Although contributions to the continuation of health education are significantly

higher than donations to VdL ($z=4.031$, $P=0.00$), donations to VdL are substantial and fall within a 95% confidence level of 7.42-9.86 soles for the participants in our experiment.

Figure 2 shows the distribution of donations to VdL.

Figure 1: Contributions to health education

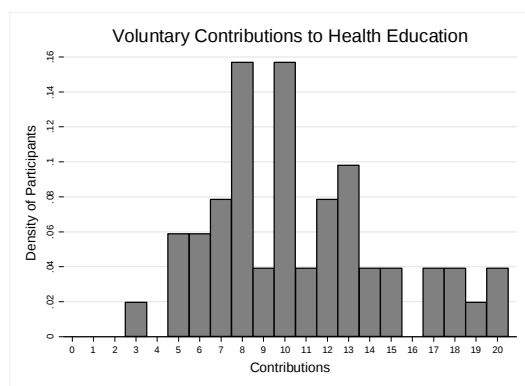
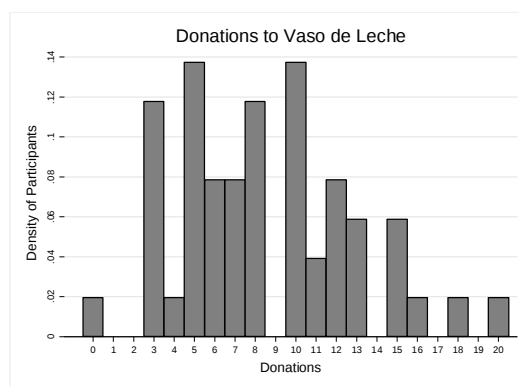


Figure 2: Donations to Vaso de Leche



Although contributions to health education and VdL are strongly rank correlated with each other ($\text{Rho}=0.600$, $P=0.00$), only 13 of the participants contributed the same amount of money to health education as to VdL. Participants do, therefore, not seem to have adapted their contributions to the different goods to each other.

Table 1: Relationships between individual and household characteristics and voluntary contributions to health education and donations to VdL respectively

	(1) Mean	(2) Standard Deviation	(3) Relationship with Voluntary Contributions to Health Education	(4) Relationship with Donations to VdL
(1) Household Consumption per capita	2548.44	2180.52	$\text{Rho}=0.18$, $P=0.22$	$\text{Rho}=0.25$, $P=0.08$
(2) Dummy for male	0.32	0.47	$z=3.03$, $P=0.00^{***}$	$z=2.78$, $P=0.00^{***}$
(3) Dummy for finished secondary school	0.46	0.54	$z=0.37$, $P=0.75$	$z=0.45$, $P=0.65$
(4) Age	33.64	8.31	$\text{Rho}=0.12$, $P=0.40$	$\text{Rho}=0.11$, $P=0.46$
(5) Number of children under 6	0.88	0.72	$\text{Rho}=-0.25$, $P=0.08^*$	$\text{Rho}=-0.29$, $P=0.04^{**}$
(6) Self-Reported Health	3.28	0.78	$\text{Rho}=0.37$, $P=0.01^{**}$	$\text{Rho}=0.21$, $P=0.16$

Note: Rho indicates a relationship derived from a Spearman rank correlation and z indicates a relationship derived from a Wilcoxon ranksum test.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

3.2 Relationships between voluntary contributions and household characteristics

Household consumption per capita does not seem to be significantly related to contributions to health education, but donations to VdL are significantly higher for households with a higher consumption level. Earlier threshold public good games have shown mixed evidence on the relationship between gender and voluntary contributions. Studies have reported both higher contributions of women (Cadsby et al, 2007) and higher contributions of men (Brown-Kruse and Hummels, 1993), but there is also some evidence showing no gender difference in voluntary contributions to threshold public goods (Cadsby and Maynes, 1998).⁵ We observe significantly higher voluntary contributions to health education and significantly higher donations to VdL for men. A higher education level does not seem to be related to the voluntary contribution rates in our experiment. Participants that have at least finished secondary school do not seem to voluntarily contribute more to health education or VdL than participants that have not finished secondary school. Age also does not seem to be related to voluntary contributions to health education or VdL. Surprisingly, households with more children under 6 years old, contribute significantly less to health education and VdL. Beforehand, one would expect households with relatively vulnerable household members regarding diarrhoea, such as children, to contribute more to health education. The negative relationship with donations to VdL is even more remarkable, because eligibility of a household for the VdL program is based on the number of children per household (Clark and Laurie, 2000). Finally, and perhaps again surprisingly, self-reported health ('1=Very Bad, 5=Very Good') is positively related to voluntary contributions to health education, but the positive relationship with donations to VdL is not significant. Possibly, the positive relationship with investment in health education occurs, because unhealthy people value

⁵ Using more powerful statistical techniques with the same data, however, Cadsby et al. (2007) find higher contribution rates of females.

preventive measures less than healthy people. Table 1 shows the relationships between voluntary contributions and household characteristics.

3.3 Contrasting Findings

The high voluntary contributions in our experiment are surprising. First, free riding to prevent individual investment in public goods can lead to underinvestment in our experiment. A threshold cost of provision could, however, have a positive effect on contributions (Isaac et al, 1989). This could be one of the reasons for the significantly higher voluntary contribution to health education. Free-rider behaviour, however, still limits the possibility to reach the aggregate valuation of the public good in our experiment.

Although free-rider behaviour could be a problem in developing countries, repeated public good games generally lead to higher cooperation rates among poor participants in Africa and Southeast Asia than among college-aged participants in the US, which suggests an inverse relationship between development and cooperation. Poor slash and burn horticulturalists in Peru, however, cooperate less than college-aged participants in the US (Cardenas and Carpenter, 2008). It is therefore unclear to what extent the free-rider problem has detrimental effects on investment in (threshold) public good games in developing countries.

A second problem is that people who are unaware of preventive measures towards diarrhoea could be unaware of their lack of knowledge. “Their incompetence robs them of the metacognitive ability to realize” benefits of health education (Kruger and Dunnig, 1999, pp 1121). This effect could be substantially increased by uncertainty about the long-term benefits of health education.⁶ This same uncertainty about long-term benefits could also lead to lower

⁶ Impact evaluations of health education programs show a mixed but slightly positive picture of effectiveness of health education. Although health education focused on preventing worms in Kenya was found not to be

investment levels in VdL.⁷ The uncertainty effect is possibly less important in the part of our experiment related to health education. Participants received information about high effectiveness of health education in Mexico during the start of the experiment, which has likely led to less ambiguity about the benefits of health education. This expectation is to some extent supported by the finding that 44 participants in our experiment (88%) agreed or highly agreed with the statement that they liked meetings in the community, because they learned a lot from these meetings. Possibly, the information about effectiveness of health education in Mexico has also played a role in the significantly higher investment in continuation of health education compared to investment in VdL, although a complementary explanation exists, which we will discuss in the remainder of this paper.

A final problem is that high discount rates could decrease investment in the long-term benefits of health education and VdL. Individual discount rates are generally higher for the poor. People in wealthier villages in Vietnam were shown to be more patient (Tanaka et al, 2006) and poor households in Mexico show a markedly higher discount rate than relatively rich U.S. households (Carvalho, 2008). It is also conceivable that high discount rates matter more to the poor if time preferences are inconsistent. Time-inconsistent preferences lead to lower investment in long-term benefits if self-control is inadequate (Laibson, 1997). Evidence

effective (Miguel & Kremer, 2007), research from Mali, however, reported that complementary malaria education alongside donations of insecticide-treated bednets led to more bednet impregnation (Rhee et al, 2005). Besides, combining nutritional supplements with health education led to a reduction of diarrhea of 20% among children of 5 years and younger (Gertler and Boyce, 2001) and health education about malaria led to higher insecticide-treated bednet use for participants with trust in health providers in rural Ghana (De Hoop & Van Kempen, 2009).

⁷ Stifel and Alderman (2006) do not find evidence for impact of the VdL program on nutritional outcomes of young children. People might, however, consider the benefits of VdL to be more self-evident and certain because of the direct nutritional impact.

for time-inconsistent preferences has been gathered in such diverse places as Kenya and India. Farmers in Kenya were shown not to save for investing in fertilizers, even if this investment was presumed to be highly profitable (Duflo et al, 2008). Small time-limited reductions in the cost of purchasing fertilizer at the time of harvest did, however, lead to large increases in fertilizer use (Duflo et al, 2009). Mothers in India were also shown not to vaccinate their children, despite obvious long-term benefits. However, a complementary food staple gift was enough to ascertain an increase in the number of vaccinations (Banerjee et al, 2008). Apparently, a small financial short-term incentive was able to reduce self-control problems significantly. Self-control problems could exist in equal measures around the world, but the problem may matter more for the poor. (Mullainathan, 2004).

3.4 Correlations between voluntary contributions and time preferences

In this section we take a closer look at the relationship between time preferences and voluntary contributions to health education and VdL. As discussed earlier, one would expect high discount rates to be negatively correlated with investment in public goods with long-term benefits. Possibly, however, this relationship is stronger for the poor because of time-inconsistent preferences combined with larger problems to mitigate self-control problems. The relationship with time preferences could also be stronger for investment in VdL, because of the short-term non-decisional value of health education.

We inferred stated time preferences in two ways. First, we asked experimental subjects whether they preferred 30 soles today or 39 soles tomorrow. Those who preferred 30 soles today (39 soles tomorrow) are considered to have a high (low) discount rate. Second, we also tried to distinguish time preferences related to health from “financial” time preferences, by asking experimental subjects whether they would prefer a medicine against diarrhoea today that guaranteed protection from diarrhoea for one year, or a medicine against diarrhoea next year that guaranteed protection from diarrhoea for one year and a half. Experimental subjects

with high discount rates related to health would prefer the medicine against diarrhoea today. These questions only provide us with dichotomous data, whereas we would ideally like to have more detailed information. We believe, however, that our measures of time preferences can give us some idea for this exploratory study.

The inferred time preferences do not seem to be significantly related to voluntary contributions to health education or donations to VdL. Wilcoxon rank sum tests⁸ do not show significantly lower investment in health education for experimental subjects with high “financial” discount rates or high discount rates related to health. We also do not find a significant relationship between “financial” time preferences and donations to VdL or time preferences related to health and donations to VdL, although the first relationship gravitates towards the negative. Row 1-2 of table 2 present the relationships between time preferences and investment in health education and time preferences and donations to VdL respectively.

3.5 Heterogeneous effects of time preferences

To test whether time preferences have a different impact on voluntary contributions for experimental subjects in relatively poor households as for experimental subjects in relatively rich households, we divide our experimental sample in two groups; 1) experimental subjects with a household consumption level per capita above the median consumption level in the complete sample population (n=25), 2) experimental subjects with a household consumption level per capita below the median consumption level in the complete sample population (n=25). Interestingly, the household consumption level per capita does not seem to be correlated with “financial” time preferences ($z=0.20$, $P=0.84$) or time preferences related to health ($z=-0.85$, $P=0.40$).

⁸ The Wilcoxon ranksum test is a non-parametric test, for which the statistic is the sum of the ranks for observations from one of the samples. We use a non-parametric alternative for the two-sample t-test to account for the low sample size and a possible non-normal distribution.

Applying Wilcoxon rank sum tests for the two subsamples, to derive relationships between voluntary contributions and time preferences, seems to confirm our hypothesis that time preferences have different implications for relatively poor households than for relatively rich households for “financial” time preferences. Investments in health education are significantly lower for the experimental subjects with high “financial” discount rates in the poor subsample. Apparently, the short-term non-decisional value of health education does not perfectly mitigate the negative effect of time preferences on investment in health education in the poor subsample. The experimental subjects with high discount rates related to health do, however, not contribute significantly more to health education than the experimental subjects with low discount rates related to health in the poorer subsample of the population. For relatively rich households there seems to be no relationship between voluntary contributions to health education and “financial” time preferences or time preferences related to health.

Results are similar for the relationship between donations to VdL and time preferences. Donations to VdL are significantly lower for poorer people with high financial discount rates. There seems to be no relationship between time preferences related to health and donations to VdL for the poorer subsample of our population. For relatively rich households donations to VdL do not seem to be related to “financial” discount rates or discount rates related to health.⁹ Results are shown in row 3-6 of table 2.

⁹ Possibly, discount rates are also negatively related to investment in public goods for people with a low or very low self-reported health. “Financial” time preferences seem to be negatively related to donations to VdL ($z=-2.14$, $P=0.03$), but not to voluntary contributions to health education ($z=1.07$, $P=0.28$). Time preferences related to health seem, however, not to be related to donations to VdL ($z=-1.17$, $P=0.24$) but to voluntary contributions to health education ($z=-1.95$, $P=0.05$). The small sample size (7) does, however, not permit us to draw firm conclusions from these relationships.

Table 2: Relationships between time preferences and voluntary contributions to health education and donations to VdL respectively

	(1) Mean	(2) Standard Deviation	(3) Relationship with Voluntary Contributions to Health Education	(4) Relationship with Donations to VdL
(1) Dummy for high financial discount rate	0.5	0.51	$z=-1.22$, $P=0.22$	$z=-1.63$, $P=0.10$
(2) Dummy for high discount rate related to health	0.64	0.48	$z=-0.53$, $P=0.60$	$z=-0.24$, $P=0.81$
(3) Dummy for high financial discount rate in relatively poor subsample	0.44	0.51	$z=-2.23$, $P=0.02^{**}$	$z=-2.49$, $P=0.01^{**}$
(4) Dummy for high discount rate related to health in relatively poor subsample	0.68	0.48	$z=-1.03$, $P=0.31$	$z=-0.65$, $P=0.52$
(5) Dummy for high financial discount rate in relatively rich subsample	0.56	0.51	$z=0.28$, $P=0.78$	$z=-0.06$, $P=0.96$
(6) Dummy for high discount rate related to health in relatively rich subsample	0.60	0.50	$z=0.48$, $P=0.78$	$z=0.22$, $P=0.82$

Note: Z indicates a relationship derived from a Wilcoxon ranksum test.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

3.6 Interpreting the results

The heterogeneous effect of time preferences on voluntary contributions to health education and VdL can be interpreted in multiple ways. Regarding health education, the rather weak relationship between time preferences and investment behaviour could be related to the short-term benefits of health education. To analyze the importance of this relationship, we relate beliefs about benefits of community meetings to the difference between voluntary contributions to health education donations to VdL. The difference between voluntary contributions to health education and donations to VdL could be seen as a proxy for the perceived importance of the participatory component in health education, although multiple other factors could be at play in determining this difference, as discussed earlier in this paper. There is, however, no reason to assume that the positive framing of benefits from health education by giving examples from Mexico or a possible threshold effect have heterogeneous impacts on the difference between investment in health education and donations to VdL. For this reason, we believe we can safely relate beliefs about short-term benefits of health education

to the difference between investment in health education and donations to VdL, to analyze the importance of short-term benefits in health education.

Indicators for beliefs about benefits of health education were operationalized with 5-point Likert scales ('1=Completely Disagree, 5=Completely Agree'). Participants in the experiment were asked for their agreement with the following statements; 1) "I like to participate in community meetings because in general I learn a lot from these meetings", 2) "I like to participate in community meetings because I meet a lot of people I know during these meetings" and 3) "Meetings wherein information is provided could be of more interest to me than for the majority of the people in Villa El Salvador".

In first instance, Spearman rank correlations show no significant relationships between the difference between investment in health education and investment in VdL and the belief in learning possibilities of meetings, the belief in social networking possibilities of meetings and the perception of relative benefits of meetings respectively, as shown in table 3. Wilcoxon ranksum tests, however, show a significantly stronger belief in learning possibilities and a significantly stronger perception of relative benefits of meetings for experimental subjects that at least voluntarily contribute 1 sol more to health education than to VdL. The relationship between a marginally higher voluntary contribution to health education and the belief in social networking possibilities of meetings also gravitates towards the positive. When we define participants with a strong belief in the benefits of health education meetings as participants with a score of 5 on either the belief in learning possibilities or the belief in social networking possibilities, Wilcoxon ranksum tests show that a strong belief in the benefits of health education is even more convincingly related to a positive difference between investment in health education and donations to VdL. All results are shown in table 3.

Table 3: Relationships between beliefs about benefits of health education and difference between contributions to health education and donations to VdL

	(1) Mean	(2) Standard Deviation	(3) Spearman Rank Correlation with Contributions to Health Education – Donations to VdL	(4) Relationship with dummy for positive difference between Contributions to Health Education and Donations to VdL
(1) Belief in learning possibilities of meetings	3.96	0.95	Rho=0.18, P=0.20	z=1.66, P=0.10 [*]
(2) Belief in social networking possibilities of meetings	3.62	1.07	Rho=0.14, P=0.35	z=1.54, P=0.12
(3) Perception of relative benefits of meetings	3.94	1.16	Rho=0.15, P=0.30	z=1.92, P=0.05 [*]
(4) Strong belief in benefits of health education meetings	0.30	0.46	z=1.25, P=0.21	z=2.49, P=0.01 ^{**}

Note: Rho indicates a relationship derived from a Spearman rank correlation and z indicates a relationship derived from a Wilcoxon ranksum test.

^{*} $p < 0.1$, ^{**} $p < 0.05$, ^{***} $p < 0.01$

Arguably, the short-term participatory component of the health education meeting has played a role in the relatively high voluntary contributions to health education. In the remainder of this section, we discuss two complementary interpretations for the reported behaviour in the experiments; 1) Self-control and time-inconsistent preferences, and 2) Paternalistic altruism.

3.6.1 Self-control and Time-Inconsistent Preferences

Self-control problems could be larger for the poor in the presence of time-inconsistent preferences. The poor usually face higher stress levels resulting in more immediate pressures on time and energy. Moreover, liquidity constraints could also limit self-control to abstain from current consumption and therefore seemed to limit the possibilities to invest in the long-term benefits of insecticide-treated bednets in Uganda (Hoffmann et al, 2009).

By adding an extra question about time preferences, we were able to distinguish between high “financial” discount rates and time-inconsistent “financial” discount rates. Apart from asking experimental subjects whether they preferred 30 soles today or 39 soles tomorrow, we also asked experimental subjects whether they preferred 30 soles one month

after the experiment (36%) or 39 soles one month and one day after the experiment (64%). Experimental subjects with time-inconsistent preferences (24%) would prefer 30 soles today but 39 soles one month and one day after the experiment. If the self-control ability of the ‘rich’ is more effective than for the ‘poor’, time-inconsistent preferences should have a higher negative impact on investment in public goods for the ‘poor’ than for the ‘rich’. Testing for relationships between voluntary contributions with time-inconsistent preferences by deriving Wilcoxon rank sum tests, we find weak evidence for lack of self-control among the poor as an explanation for the heterogeneous relationship between time preferences and voluntary contributions¹⁰. Although relatively poor experimental subjects with time-inconsistent preferences donate significantly less to VdL than relatively poor experimental subjects that prefer 30 soles today ($z=-2.24$, $P=0.03$) the relationship with investment in health education is less clear ($z=-1.54$, $P=0.12$). Possibly, the short-term non-decisional value of health education has mitigated the negative relationship between investment in health education and time-inconsistent preferences. There are, however, a number of other complementary explanations.

3.6.2 Paternalistic Altruism

The collective nature of the future benefits in our experiment opens up an alternative interpretation of the heterogeneous impact of time preferences on investment in public goods. Public investment may induce altruism.¹¹ This holds especially for investment in the health of others. Altruism has been found to be paternalistic with respect to health. When experimental subjects could either donate money or nicotine patches to a smoking diabetes patient whose willingness to pay for nicotine patches is positive but below the market price, more than 90%

¹⁰ There were 5 respondents (10%) that reported to prefer 39 soles tomorrow and 30 soles one month after the experiment. It is unclear whether these experimental subjects understood the second question. Therefore we excluded these experimental subjects from our analyses related to time-inconsistent preferences.

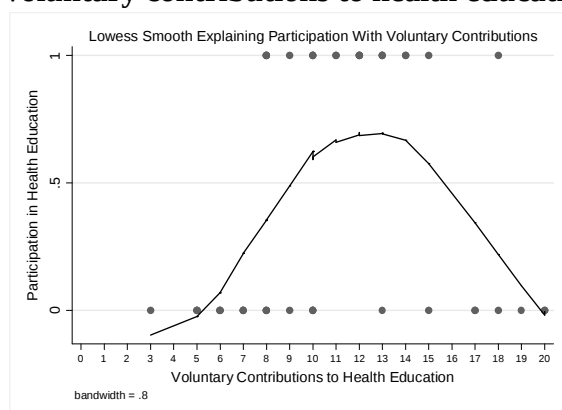
¹¹ We define altruism as the sum of warm glow (Andreoni, 1990) and pure altruism.

of the donations were given in kind rather than cash (Jacobsson et al, 2007). Experimental subjects that perceive others to gain more from health education could benefit more from participation of others in health education than from direct monetary benefits for themselves.

We use the relationship between investment in health education and actual participation in the health education meeting a week after the experiment to pay closer attention to the paternalistic altruism interpretation of our results. Participants in the health education meeting (46%) differ from non-participants (54%) in two respects. First, the household consumption level of participants in health education is higher ($z=1.94$, $P=0.05$). Second, among participants in health education there are more experimental subjects that have at least finished secondary school ($z=1.77$, $P=0.08$). Participants and non-participants do, however, not differ significantly with respect to other socio-economic characteristics, gender, language spoken in daily life, health and social capital.

Interestingly, investment in health education is significantly higher for participants in health education ($z=1.92$, $P=0.06$), but a closer look reveals that the relationship is highly non-linear. We visualize the non-linear relationship with a non-parametric univariate lowess smooth, in which no assumption is made that the relationship between participation and investment in health education is represented by a straight line. It depicts the local relationship between participation and investment in health education over parts of their ranges, and shows that participation and investment in health education only seem to be positively correlated for relatively low levels of investment in health education. For higher investment levels the relationship seems to be negative. The lowess smooth is shown in figure 3.

Figure 3: Lowess smooth explaining actual participation in health education with voluntary contributions to health education



Arguably, experimental subjects with a relatively high investment level in health education could be paternalistically altruistic and value future health benefits for participants in health education more than monetary benefits for themselves. Borghi and Jan (2008) also identified altruism as one of the motives for willingness to pay for health promotion programs in Nepal.

The interpretation of altruism-induced collective action is, however, empirically difficult to distinguish from self-imposed choice constraints (Sen, 1977). Experimental subjects with a relatively high investment level in health education could also have acted for the greater good beyond the individual level, as the so-called social norm activation is defined in the social psychology literature (Freestone and McGoldrick, 2008).

4. Discussion

This paper puts forward a new methodology to identify voluntary contributions to local public goods with long-term benefits. We incorporated revealed preferences in our research design, but rather than playing a traditional public good game we let players contribute to health education offered by an NGO. Participants were informed that the health education meeting would only materialize if the cumulative sum of investment exceeded a certain threshold value. In this way, we were able to incorporate long-term health benefits and the bias against matching private money with development aid in our experiment. We therefore argue that the

experiment is less sensitive to confusion and a lack of control at a basic level in developing countries, in which public goods are normally not provided in monetary form and often contain long-term benefits.

The result provides food for thought for aid policy. As described earlier in this paper, aid distributors did not expect high voluntary contributions to public good provision. Pure free-rider behaviour is, however, non-existent in our experimental sample and contributions to health education are remarkably high. People do not necessarily seem to be unwilling to invest in local public goods with long-term benefits. Results from a complementary experiment show that the high voluntary contribution rate to health education does not stand on its own. Although significantly lower than voluntary contributions to health education, donations to the VdL program were positive and substantial. Apparently, experimental subjects were willing to donate a substantial amount of money to obtain long-term community health benefits. We have to be cautious in interpreting our results, however. The windfall character of the gain for the participants in our experiment could have created an upward bias in their investment level. Therefore, the results only hold when cash hand-outs are not anticipated. Besides, strategic behaviour in the public good game could have lead to a bias in the level of voluntary contributions to health education. This bias is, however, not likely to be upward, because of possible free-rider behaviour.

High discount rates only seem to have detrimental effects on voluntary contributions for the most deprived. Financial time preferences are negatively correlated with investment in health education and donations to VdL for households with a below-median consumption level per capita. Arguably, short-term benefits of health education, such as the joy of learning, could have lead to the relatively weak correlation between discount rates and investment in health education. This notion is supported by a significant positive relationship between beliefs about short-term benefits of health education and a dummy variable that is 1 if the

difference between voluntary contributions to health education and donations to VdL is positive. Several complementary interpretations for the behaviour in our experiments can be identified, such as time-inconsistent preferences and paternalistic altruism.

Independent of the motivation, it remains remarkable that relatively poor people are willing to give up a substantial amount of cash income for investment in local public goods with long-term benefits. Given the exploratory character of our research, more research about the motivations behind this behaviour is clearly needed.

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