



# No excuses for good behavior: Volunteering and the social environment

Sera Linardi <sup>a</sup>, Margaret A. McConnell <sup>b,\*</sup>

<sup>a</sup> Graduate School of Public and International Affairs, University of Pittsburgh, 3407 Posvar Hall, Pittsburgh, PA 15260, USA

<sup>b</sup> Center for Population and Development Studies, Cambridge, Massachusetts 02138, USA

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## ABSTRACT

We study the effect of the social environment on the quantity and quality of voluntary labor contributions. By extending Benabou and Tirole's (2006) image signaling framework, we derive theoretical predictions on time volunteered given (1) the availability of excuses to stop volunteering and (2) the presence of an authority figure. We test these predictions in an experiment where laboratory subjects are directly involved in a local nonprofit operation. We find that in the absence of excuses to stop volunteering, subjects volunteer longer without working less productively. This increase is partially driven by subjects' reluctance to be the first to stop volunteering. The presence of an authority figure has little impact, but the presence of peers has a positive and significant impact.

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## 1. Introduction

Economists have long been interested in the motivation behind prosocial behavior such as volunteering or donating money. Andreoni (1989) proposes a model in which individuals are intrinsically motivated by altruism to contribute to others' well-being. However, empirical evidence has shown that prosociality may be linked to public observation and can be crowded out by material rewards.<sup>1</sup> This evidence motivated several recent theoretical models where prosocial behavior is used as a signaling mechanism to gain social image benefits (Seabright 2004; Benabou and Tirole, 2003, 2006; Ellingsen and Johannesson, 2008). In practice, prosocial behavior typically occurs in settings where multiple social mechanisms may be taking place simultaneously. Can the image signaling framework help us identify and manipulate components of a given social environment to encourage prosocial behavior?

We attempt to answer this question in the context of volunteering. Volunteering, an activity that involves 26.4% of the US population<sup>2</sup>, is crucial to the functioning of the nonprofit sector. Studies consistently

show that the value of individual volunteering is higher than the value of household charitable giving.<sup>3</sup> We focus on two ubiquitous features of the volunteering environment. First, it is common knowledge that external circumstances can pose restrictions on some volunteers' ability to contribute time. These external restrictions are often difficult to verify, providing all volunteers with excuses for their own lack of contribution. Second, nonprofits often send representatives to informally supervise volunteers, under the assumption that these representatives' presence increases the pressure to contribute.<sup>4</sup>

We identify two social signaling mechanisms in the environment described above and theoretically derive predictions on contributed time using an extension of Benabou and Tirole's (2006) binary participation model. First, we predict that unverifiable excuses will dampen the stigma of not contributing. Removing excuses intensifies this stigma, and consequently, the image reward of working. Therefore the average time contributed will be higher in the absence of excuses. Second, the presence of a representative increases subjects' awareness of being observed, thus increasing the image reward of contributing. We predict that removing this 'monitor' will decrease the average contribution of volunteered time.

\* Corresponding author.

E-mail addresses: [linardi@pitt.edu](mailto:linardi@pitt.edu) (S. Linardi), [mmcconne@hsph.harvard.edu](mailto:mmcconne@hsph.harvard.edu) (M.A. McConnell).

<sup>1</sup> For example, Andreoni and Petrie (2004) and Rege and Telle (2004) find that removing the anonymity of gifts in a public goods game increases contributions. Frey and Jegen (2001) provide an early survey on crowding out. See Ariely et al. (2009) and Carpenter and Myers (2009) for recent evidence.

<sup>2</sup> 61.8 million people, Bureau of Labor Statistics (2008), <http://www.bls.gov/news.release/volun.nr0.htm>.

<sup>3</sup> For example, Independent Sector estimates that time volunteered in 2001 was valued at \$240 billion (at \$15.68 per hour) while household charitable giving was \$153 billion: <http://www.independentsector.org/programs/research/gv01main.html>.

<sup>4</sup> DellaVigna et al. (2009) find that when individuals have the option to avoid being visited by a charity representative in person, their gifts are reduced by 30%.

While little is known about labor contribution in the presence of excuses, a growing literature suggests that unconditional monetary transfers are less generous when others may not learn of a player's decision (Andreoni and Bernheim 2009; Tadelis 2007). On the other hand, existing literature provides conflicting predictions on the impact of a monitor's presence on labor. Dickinson and Villeval (2008), Falk and Kosfeld (2006), Frank and Schulze (2002), and Frey and Oberholzer-Gee (1997) argue that the presence of a monitor may be interpreted as distrust and decrease prosocial contributions. However, the demand effect literature posits that the desire to please authority figures drives laboratory subjects to be more altruistic when the experimenter is present.<sup>5</sup>

The impact of social environment manipulations on volunteering may be more complex than on monetary donations. First, unlike money, contributions of labor are multidimensional. Holmstrom and Milgrom (1991) have shown that incentives can increase the emphasis on the rewarded dimension of a task to the detriment of unrewarded dimensions. Image rewards may encourage contributions of time, which are readily visible, but harm productivity. Second, monetary contributions are often studied in a static social environment, thus missing the dynamic changes that occur in a work environment over time. Third, given the higher degree of personal involvement inherent in labor contribution, manipulations that are effective in encouraging monetary contributions may not be effective in encouraging volunteering. In fact, Ellingsen and Johannesson (2009) find that fewer subjects in a bargaining game demand compensation for time investments compared to monetary investments.

We partner with the Los Angeles nonprofit School on Wheels (SOW)<sup>6</sup> to have lab subjects perform online internet search and data entry to build SOW's database of educational resources, thus integrating the realism and context of volunteering into the controlled social environment of the laboratory. To test the effect of excuses, we utilize privately known random maximum stopping times that restrict the contribution of some subjects. The existence of this random mechanism provides excuses for subjects who do not face a stopping time (*unrestricted* subjects). To test our predictions about the role of a monitor, we use the experimenter as a representative of an authority figure.

We find that subjects volunteer less when external circumstances provide excuses for low contribution. Furthermore, we find evidence of differential departure patterns depending on the availability of excuses. Subjects are more likely to stop volunteering when others have stopped and are more likely to leave in clusters *only* in the absence of excuses. This behavior is consistent with stigma avoidance but not with framing, anchoring, conditional cooperation, or conformity.

We do not find, however, that removing the experimenter decreases volunteered time. Consistent with evidence from Frank (1998) that subjects are not sensitive to the payoff of the experimenter, our subjects do not appear to be affected by the presence of the experimenter. Subjects do, however, care about other subjects: the likelihood that an individual continues to volunteer increases with the number of subjects that are still volunteering. Average productivity, as measured by database entries per minute, remains unaffected throughout all the treatments, suggesting that the social environment can be manipulated to increase the average quantity of contribution without affecting average quality. Overall, our findings suggest that while image signaling mechanisms can increase prosocial behavior, the effectiveness of these strategies depends on the details of the social environment.

The paper proceeds as follows. In Section 2 we describe the theoretical model and predictions for our experimental treatments. Section 3 describes our experimental design and the survey instrument.

<sup>5</sup> See Paulhus (1991) Levitt and List (forthcoming), and Fleming et al. (2007). Zizzo (2009) noted that vertical social pressure (experimenter) may be confounded with horizontal pressure (other subjects) in many studies.

<sup>6</sup> School on Wheels provides tutoring for homeless children: <http://www.school-onwheels.org/>.

In Section 4 we present the results and Section 5 concludes. Proofs for Section 2 and experimental materials (instructions, software screen shots, and survey questions) can be found in Appendix A.

## 2. Theoretical framework

A typical volunteering setup involves a representative from an organization and a group of potential contributors. Everyone knows that external circumstances may restrict some individuals' ability to contribute; these obstacles occur privately and are unverifiable. We present an extension of Benabou and Tirole's (2006) binary participation model<sup>7</sup> to illustrate the image signaling mechanisms that may be present in this environment. Formal details and proofs can be found in Appendix A.

Let  $v$  be an agent's intrinsic motivation to volunteer. We model  $v$  as a random variable with distribution function  $g(v)$  and an associated density function  $G(v)$ . Let  $x > 0$  be the visibility of volunteering, which represents an agent's awareness of being observed.

Following BT let the decision to volunteer be a binary choice  $a = \{0, 1\}$ . Let  $C$  be the cost of volunteering. An individual with type  $v$  who faces a choice to volunteer with visibility  $x$  has the following utility for volunteering<sup>8</sup>:

$$u(a = 1) = v - C + x(E(v|a = 1) - E(v|a = 0)) \quad (1)$$

Individuals participate if  $v \geq C - x(E(v|a = 1) - E(v|a = 0)) \equiv v^*$  where the equilibrium threshold of altruism  $v^*$  is implicitly defined by the equation:

$$v^* - C + x(E(v|v \geq v^*) - E(v|v < v^*)) = 0 \quad (2)$$

BT show that when the distribution of altruism  $g(v)$  is decreasing or constant in  $v$ <sup>9</sup>, there is a unique equilibrium threshold  $v^*$ . Without this assumption (e.g. when  $g(v)$  is increasing or unimodal in  $v$ ), multiple equilibria exists for a large range of  $C$  and  $g(v)$ , making it difficult to derive theoretical predictions. We will therefore make the simplifying assumption that  $g'(v) < 0$  for the rest of this paper.

We introduce excuses by considering some probability  $\delta \in [0, 1]$  that individuals are prevented from volunteering by (unverifiable) external circumstances. When there are excuses for not participating, it is straightforward to infer the type of agents who participate, but more difficult to determine the type of agents who do not. This is because there are two reasons that an agent might not participate: with probability  $\delta$  he has been prevented by circumstances, and with probability  $1 - \delta$  he is not altruistic enough to participate. In other words, unverifiable external circumstances provide *excuses* for all agents to not participate.

More formally, let  $\Delta(v^*|x) = x(M^+(v^*) - M^-(v^*))$  be an agent's *image reward* from participating, where  $M^+(v^*) \equiv E(v|v \geq v^*)$  is the *honor* for participating and  $M^-(v^*) \equiv E(v|v < v^*)$  is the *stigma* of not participating. Credible excuses do not change the honor of participating but lessen the stigma of not participating:

$$M^-(v^*|\delta) \equiv \frac{\delta E(v) + (1 - \delta)G(v^*)E(v|v < v^*)}{\delta + (1 - \delta)G(v^*)} \quad (3)$$

In Appendix A we show that when excuses are available, participation can still be described by a unique equilibrium  $v^*$ . We then extend this binary participation framework to model an agent's contribution of time. This extended model identifies two image signaling mechanisms in the volunteering environment described earlier. First, the availability of

<sup>7</sup> Henceforth BT.

<sup>8</sup> Note that  $u(a = 0) = 0$ .

<sup>9</sup> There are fewer highly altruistic types in the population than less altruistic types.

excuses ( $\delta$ ) reduces the stigma of low contribution, thus reducing the image rewards from contributing time. Second, assuming that the presence of an authority figure increases an agent's awareness of being observed, the image reward of volunteering will increase when the experimenter is present. We formally derive two predictions on the impact of altering this social environment on average time volunteered. Since an agent's productivity has no image signaling value, it should remain unaffected by image treatments.

- *Excuses prediction:* removing excuses increases average time volunteered.
- *Monitoring prediction:* reduced monitoring decreases average time volunteered.

### 3. Experiment

To analyze how a particular social environment affects contributions of labor, the immediate impact of the environment needs to be isolated from other contributing factors. This is difficult to do in empirical studies, since volunteers may be motivated by long term concerns such as networking or resume building. The laboratory setting offers some advantages over the field in identifying short term image concerns: fewer opportunities for strategic reputation building, ease of constraining the audience, and precision in measuring the quantity and quality of contribution. To integrate realism and context into the controlled lab setting, we partner with the nonprofit School On Wheels (SOW) to design a real volunteering task.

#### 3.1. Experimental design

Subjects received an email publicizing an opportunity to participate in an experiment on decision making that did not mention volunteering.<sup>10</sup> The experiment consisted of two stages: training and volunteering.

The training session lasted 15–20 min. The experimenter started by introducing SOW and distributing SOW promotional materials.<sup>11</sup> After all subjects indicated they had adequate time to read the materials, the experimenter explained the volunteering task. SOW requested help in building a database of educational resources. This task consisted of doing internet searches and entering the information into a database; up to seven entries (subject, website address, grade level, etc) could be made per resource. Each subject received a task sheet listing the areas in the database assigned to them. Subjects were aware that they were all working on different portions of the database and that their work would not be redundant.<sup>12</sup> Subjects then practiced the task by performing one directed internet search and one data entry task. After everyone had completed the training session, we announced they had earned their show up fee (\$20) and were free to go; if they chose to, they could stay in the lab and volunteer for SOW by performing the task they had just practiced. Subjects were informed that they were free to leave at any point and that the lab would be available for the next 90 min. We clearly stated that no additional monetary incentives would be forthcoming.

#### 3.2. Treatments

All subjects in a session were assigned to one of the three treatments described below. See [Appendix A](#) for the script of instructions read to subjects.

##### 3.2.1. Baseline = excuses + monitored

*Excuses:* a random mechanism embedded in the database software provided subjects with excuses to quit volunteering. Subjects clicked on a button on their screen to 'roll a die' after the training session. This die determined an individual's maximum time limit; a subject could stop at any point before the time limit but could not make any further database entries afterwards. This random mechanism introduced the probability  $\delta$  of being prevented from working by external circumstances described in [Section 2](#). Subjects were aware that each person could be limited by the randomly determined maximum time but were unaware of the true probability distribution of time limits. This approximates the natural occurrence of excuses where the true distribution of obstacles to prosocial behavior is unknown; all that is known is that  $E(\delta) > 0$ .

In our experiment,  $\delta = 0$  with probability  $\frac{2}{3}$ , ensuring that a large share of the data was generated from subjects who had no time restriction and could be compared directly to subjects in the Remove Excuses treatment (see below). In order for it to be credible to subjects that there was a randomly generated stopping point, we set  $\delta = 1$  with probability  $\frac{1}{6}$ , meaning that some subjects may leave the lab right away. The remaining  $\frac{1}{6}$  of subjects received a time limit randomly chosen between 1 and 90. Neither the experimenter nor other subjects in the room know for certain if a subject had stopped by choice or because of the random mechanism.

*Monitored:* the experimenter stayed at the front of the room throughout the entire session and answered subjects' questions in person.<sup>13</sup>

##### 3.2.2. Remove Excuses: no excuses + monitored

*No excuses:* in this treatment, the random mechanism was disabled. After training, subjects were told that they could stay in the lab and volunteer for any amount of time they chose, up to 90 min.

##### 3.2.3. Remove Monitor: excuses + unmonitored

*Unmonitored:* in this treatment, the experimenter left the room after training. In case questions about lab protocol or the volunteering task arose throughout the experiment, subjects could initiate contact with the experimenter through an anonymous chat software. Subjects randomly selected chat IDs out of a paper cup, thus fully assuring that their identities were protected from the experimenter.

##### 3.2.4. Implementation

Pilot tests of the laboratory experiments took place at Claremont McKenna College in 2007 and the full set of experiments was run at UCLA<sup>14</sup> in Spring 2008 and Spring 2009.<sup>15</sup> The full set of experiments was run as 13 separate sessions with a total of 156 subjects. We ran 4 sessions of Remove Excuses, 5 sessions of Baseline, and 4 sessions of Remove Monitor; the average number of subjects per session in each treatment is 12.<sup>16</sup> We consider three outcome variables: the number of minutes worked by subjects, the number of entries completed and the number of entries completed per minute.

Over the course of running the experiments, subject volunteers completed a database of lesson plans before continuing on to educational activities.<sup>17</sup> The change of task was necessary to ensure that subjects' volunteered efforts continued to be useful for the organization. All data analysis controls for the task change.

After the experiment, we collected data from subjects on demographic characteristics that have been found to be correlated with

<sup>10</sup> Recruitment follows standard CASSEL (UCLA experimental lab) protocol.

<sup>11</sup> Promotional materials included SOW website, a People magazine article on SOW and a thank you letter from SOW's lead volunteer coordinator to the lab volunteers.

<sup>12</sup> The list contained several choices of grade levels and school subjects that have been randomly drawn, then adjusted to minimize overlap between subjects. We do this to increase the independence of the value of an individual's database entries from other subjects', thus decreasing concerns for free-riding present in traditional public goods experiments.

<sup>13</sup> A lab technician was available to deal with computer problems if they arose.

<sup>14</sup> We attempted to replicate our experiment with actual SOW tutors, however logistical restrictions resulted in inadequate participation.

<sup>15</sup> The experiments ran at Claremont include only a subset of the treatments discussed in the paper. The pilot results support the findings of this paper and are available upon request.

<sup>16</sup> See Table 2 for session level statistics.

<sup>17</sup> The complete database of the results of subjects' volunteer work is available at <http://www.hss.caltech.edu/~slinardi/data.xls>.

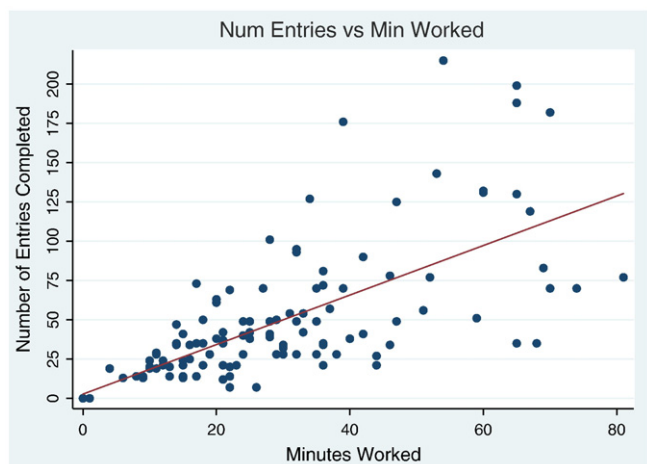


Fig. 1. Time volunteered and amount of work completed.

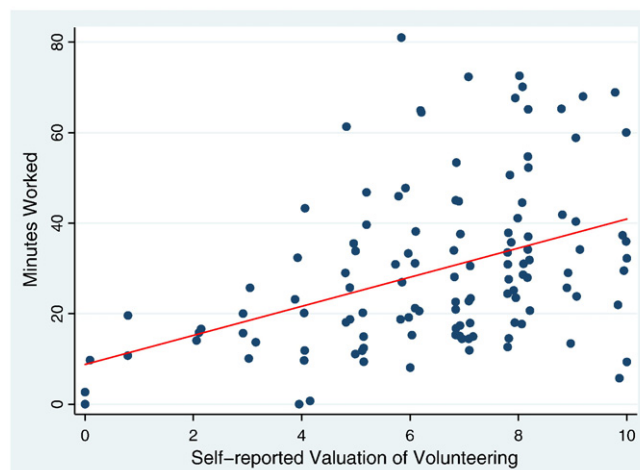


Fig. 2. Time volunteered and self-reported value of volunteering.

prosocial behavior.<sup>18</sup> To control for past volunteering experience, we ask subjects to report the length of time since their last volunteering experience and to rate that experience. We also asked them to rate the value of the lab volunteering task. In order to establish a measure of subjects' sensitivity to being paid, we asked them if they would prefer to work for an organization that pays volunteers for their time. Lastly, we asked the subjects to report the number of people in the room they knew by name to control for the relevance of social connections or peer pressures. The data collection was conducted by an online survey; subjects were automatically directed to that page when they click on a 'Finish Volunteering' button on the database software.

#### 4. Results

Among our 156 subjects, 121 subjects were not affected by the random stopping time, receiving a time limit of 90 min. We classify these subjects as *unrestricted* and the remaining 35 subjects as *restricted*. Unless indicated otherwise, the data analysis focuses on comparing the behavior of *unrestricted* subjects across the treatments.<sup>19</sup>

##### 4.1. Consistency of lab behavior with natural volunteering behavior

To check whether the experimental setting induced behavior consistent with volunteering behavior in a natural setting, we perform several robustness checks. First we examined output to verify that subjects were actually working during the experiment. Fig. 1 shows the relationship between the number of minutes worked and the entries completed. The strong positive trend between minutes worked and entries completed suggests that subjects were actually working instead of merely pretending to work.<sup>20</sup>

We then examine the relationship between the number of minutes worked and their valuation of the lab volunteering task. Consistent with evidence on the role of intrinsic altruism<sup>21</sup>, the higher subjects rated the task, the longer they work (Fig. 2).

Table 1  
Summary statistics.

	Remove Excuses	Baseline	Remove Monitor
	No excuses monitored	Excuses monitored	Excuses Unmonitored
Average	38.76	20.02	26.97
Standard error	(3.06)	(1.78)	(2.19)
N	49	41	31

Unrestricted subjects only.

##### 4.2. Quantity of contribution: time volunteered

Subjects exhibited a wide range of behavior in the experiment, with some subjects leaving right away while others remained to volunteer for nearly 90 min. Table 1 shows the average minutes volunteered in each of the three treatment groups. Fig. 3 presents a comparison of the empirical distributions of minutes volunteered.

Consistent with the *Excuses prediction*, removing excuses increased the average minutes volunteered. The difference between Remove Excuses and Baseline is positive and statistically significant at the 1% level using a non-parametric Wilcoxon (Mann–Whitney) test ( $z = 4.26$ ). In contrast, the *Monitoring prediction* is not supported by the data. The average minutes volunteered in Remove Monitor was significantly higher (at the 5% level) than minutes volunteered in Baseline (Mann–Whitney test statistic  $z = 2.41$ ).

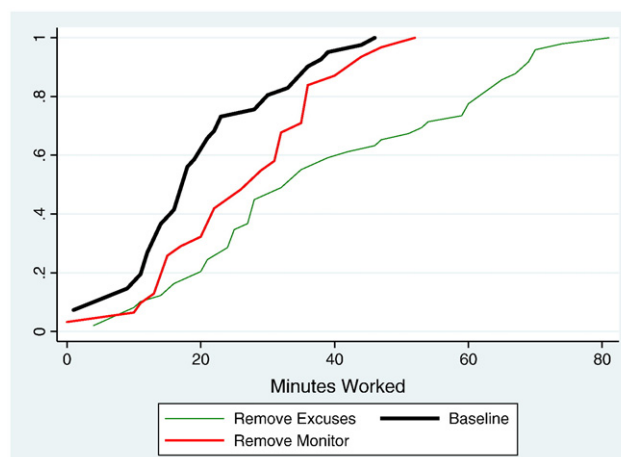


Fig. 3. CDF of minutes volunteered.

<sup>18</sup> See Mellström and Johannesson (2008), Schady (2001), and Freeman (1997) for gender and Brooks (2006) for religious activity.

<sup>19</sup> Excluding *restricted* subjects does not introduce selection effects since these subjects were randomly chosen by our mechanism. A duration model of the full sample with controls for time restrictions is included in Appendix A Table 1.

<sup>20</sup> At the end of the experiment, we manually checked browser histories and found only 5 cases of internet usage unrelated to the volunteering task.

<sup>21</sup> Finkelstein (2008) found that self reports of satisfaction predicted time spent by hospice volunteers.



**Table 2**  
Session level statistics.

Treatment	Session averages (minutes worked)	Standard deviation	Min	Max	Number of unrestricted Subjects	Total subjects	Average of session averages
Excuses monitored (baseline)	18	13	1	39	6	12	21
	18	9	9	35	10	13	
	31	9	18	44	6	11	
	22	14	1	46	10	13	
	15	7	1	23	9	12	
Excuses unmonitored (Remove Excuses)	26	21	0	52	5	10	27
	28	11	11	42	7	12	
	29	13	13	47	10	13	
	25	7	15	36	9	11	
No excuses monitored (Remove Monitor)	53	14	32	74	10	10	42
	23	15	4	53	16	16	
	67	6	60	81	10	10	
	25	5	15	35	13	13	

Unrestricted subjects only.

The cumulative density graph in Fig. 3 tells the same story. The distribution of minutes worked in the Remove Excuses treatment and in the Remove Monitor treatment stochastically dominates the distribution of minutes worked in the Baseline.

Table 2 reports session level summary statistics for all 13 sessions. We see a consistent pattern of higher average minutes worked in Remove Excuses treatments. A Mann–Whitney test for the difference in average minutes worked at the session level across Excuses and Remove Excuses treatments yields  $z = 1.39$  (p-value of 0.08 for a one-sided test). The effect of removing excuses appears robust to localized social dynamics occurring at the level of the experimental session. On the other hand, we do not see a consistent pattern of higher average minutes worked in the Remove Monitor treatment compared to the Monitored treatments (Mann–Whitney  $z = 0.77$ ).

Table 3 reports the regression results examining *Excuses prediction* and *Monitoring prediction*. We included a dummy variable ‘Task1’ to control for the change in task from worksheet searches to educational activity searches. Model 1 is a least squares regression on time volunteered controlling for gender, religiosity, volunteer experience, and peer network.<sup>22</sup> Model 2 estimates a random effects model for experimental sessions to allow for the possibility of group specific norms, or other correlation in behavior within session. The estimated coefficient on ‘Remove Excuses’ suggests that removing excuses doubles the time volunteered when compared to Baseline. The treatment effect of Remove Monitor does not appear to be robust to controls for session level dynamics.

In both models, demographic characteristics do not have predictive power in explaining time volunteered, although the signs of the coefficients follow field evidence to a certain extent.<sup>23</sup> A test for the joint significance of all of the demographic controls yields an F-statistic of 0.53 for Model 1 and a  $\chi^2$ -statistic of 3.67 for Model 2. While empirical studies suggest that demographic variables such as gender and religion are correlated with volunteering activity, they are not a central determinant of behavior in our experiments.

#### 4.3. Quality of contribution: productivity

We now investigate whether our social environment manipulation affect the less visible dimensions of labor contribution. Model 3 is a

random effects model with the number of database entries completed as the dependent variable. Consistent with the findings from Model 2 (minutes worked), we find that Remove Excuses doubled the number of entries completed while Remove Monitor has little effect.

Model 4 uses the number of entries per minute as a measure of productivity. The *Task1* dummy is positive and significant, suggesting that subjects searching for worksheets were working faster than subjects that were searching for educational activities.<sup>24</sup> The coefficient on Remove Excuses is close to zero and not significant. While not significant, the coefficient on Remove Monitor is negative, suggesting that while we see more time volunteered in the unmonitored sessions, the time volunteered may be slightly less productive. Unlike our estimation of treatment effect on contributed time, the Breusch Pagan test did not indicate statistically significant session level random effects (test statistic = 0.45).

Overall, the results from Sections 4.1, 4.2 and 4.3 suggest that removing external obstacles that restrict a small fraction of volunteers has a powerful impact on the rest of the volunteers. The Remove Excuses treatment increases time volunteered without decreasing productivity. On the other hand, the impact of an authority figure's presence in the room is inconclusive. The coefficients for Remove Monitor weakly suggest that subjects work more productively for fewer minutes when the experimenter leaves the room. Overall, being observed seems to have little impact when there is little stigma associated with low contributions.

#### 4.4. Peer effects

The literature on experimenter demand effects and leadership assume that people want to gain the esteem of an authority figure and will therefore behave more prosocially when such a person is present. However, in line with Frank's (1998) findings that the decisions of subjects in the lab are not sensitive to the payoffs of the experimenter, our results do not indicate that subjects are concerned with the experimenter. Who then, do the subjects care about?

In this section we investigate the possibility that the salient audience for subjects is their peers. Falk and Ichino (2006) find that individuals work more when working alongside others. This may be due to image signaling mechanisms (a peer group provides a larger

<sup>22</sup> We impute the demographic characteristics of one subject who failed to complete the survey.

<sup>23</sup> For example, the negative coefficient of *Male* is consistent with empirical findings that women volunteer more than men. Stronger evidence for gender effects can be seen in the duration model in Table 4.

<sup>24</sup> Models 1 and 2 of Table 3 and the duration models in Table 4 and Appendix A Table 1 suggest that subjects working on Task1 worked fewer minutes. Our conjecture is that worksheet searches may have been easier to conduct but less interesting than activity searches.

**Table 3**  
Main treatment effects.

	Least squares	Random effects		
	Model 1	Model 2	Model 3	Model 4
	Minutes worked		Entries	Entries/min
(Intercept)	21.975*** (4.066)	21.907*** (7.172)	33.461*** (11.715)	1.393*** (0.230)
Remove Excuses	19.959*** (4.216)	22.124** (10.240)	36.465** (14.409)	0.195 (0.248)
Remove Monitor	7.724** (3.218)	6.815 (10.280)	1.152 (14.656)	−0.309 (0.256)
Task 1	−5.26 (3.551)	−4.231 (8.826)	18.655 (12.465)	0.805*** (0.215)
Random effects (by experiment)		YES	YES	YES
P		0.612*** (185.97)	0.190*** (15.46)	0.058 (0.45)
Breusch Pagan LM statistic				
Covariates				
Male	−2.622 (3.065)	−2.48 (2.190)	−12.232* (6.652)	−0.105 (0.158)
Religious	0.432 (3.163)	2.062 (2.247)	−1.479 (6.823)	−0.044 (0.162)
Recent volunteer	1.716 (3.103)	1.454 (2.154)	3.045 (6.589)	0.013 (0.157)
Know other subjects	−2.783 (3.145)	−2.814 (2.793)	3.533 (8.561)	0.250 (0.205)
N	121	121	121	121
Test statistic	4.880	8.740	17.850	22.830
P-value	0.000	0.272	0.013	0.002
Test	F-test	Wald test	Wald test	Wald test

Robust standard errors in parenthesis.

Unrestricted subjects only.

\*\*\* Significant at 1%.

\*\* Significant at 5%.

\* Significant at 10%.

audience), higher enjoyment or lower cost of working due to camaraderie (Rotemberg 1994), or conformism (a desire to do what everyone else is doing (Bernheim 1994)).<sup>25</sup> Since the number of peers changes as people leave, volunteering creates an environment where the social factors affecting contribution change dynamically.

To address this we utilize a discrete time model, where we consider an individual's likelihood of continuing work in five minute intervals.<sup>26</sup> As before, we consider the subsample of 121 *unrestricted* individuals<sup>27</sup> and include a separate intercept to account for the change from worksheet searches to activity searches.<sup>28</sup> Model 1 estimates the baseline discrete time duration model without including anytime varying social factors. In any time interval, subjects are 24% more likely to continue volunteering when excuses are removed and 10% more likely to continue working without the experimenter in the room. Willingness to work declines over time: with every additional 5 min, the likelihood that subjects continue to work decreases by 6%.

Model 2 of Table 4 investigates the influence of peers on an individual's decision to continue working. The variable '# subjects remaining in period' controls for the number of subjects present in the room at the beginning of each five minute interval. The presence of an additional peer observer at the start of a five minute interval increases the

probability of working through the end of the interval by 5%. The interaction with 'Remove Excuses' and 'Remove Monitor' are not significant, suggesting that peer effects remain consistent across treatment groups.

The marginal effect of 'Remove Excuses' is significant and positive. This suggests that unrestricted subjects in Remove Excuses are still 18% more likely to continue working than unrestricted subjects in the Excuses treatment even after controlling for the effect of restricted subjects' exits on group size. On the other hand, the coefficient 'Remove Monitor' is positive but not significant. This cannot be accounted for by our model, since removing the monitor should reduce visibility. However, this finding is consistent with image signaling models where image rewards depend on the identity of the audience (Ellingsen and Johannesson, 2008) and related models of crowding out from monitoring (Dickinson and Villeval 2008).<sup>29</sup> The next section attempts to disentangle subject's image concern from other potential motivators.

#### 4.5. Stigma avoidance and clusters

Could the higher contribution of time in Remove Excuses have been driven by reasons other than image concerns? We first consider whether the random time limit introduced framing and anchoring. Even though we attempted to avoid framing effects by wording the instructions as similarly as possible across treatments<sup>30</sup>, we cannot entirely rule out the possibility that the treatments affected subjects'

<sup>25</sup> In standard public good experiments, subjects may be motivated to work only when others are also working due to concerns about free-riding. However, free-riding concerns are unlikely in our experiment as subjects were assigned independent tasks and did not benefit from the resulting database.

<sup>26</sup> The results are robust to smaller intervals of time. Since it takes less than 5 min to find an educational resource and enter the information into the database, intervals larger than 5 min are too large to capture the impact of changes in the social environment.

<sup>27</sup> See Appendix A Table 1 for the full sample of 156 subjects. All conclusions hold qualitatively.

<sup>28</sup> The Task1 dummy is negative and statistically significant, consistent with our earlier conjecture that worksheet searches may have been easier to conduct but less interesting than activity searches.

<sup>29</sup> Monitoring causes crowding out if it communicates distrust without having a disciplining effect. Peer observation may be preferred to central monitoring in this setting since it does not communicate distrust. Another possibility is that subjects may be signaling altruism to their peers and signaling obedience to authority.

<sup>30</sup> See Appendix A. All treatments state that subjects can stay and volunteer unpaid as long as they like up to 90 min. The random mechanism is explained as a method of ensuring subject's privacy.

**Table 4**  
Duration model (unrestricted subjects).

	Model 1	Model 2	Model 3	Model 4
Probability of working	0.161 dy/dx	0.194 dy/dx	0.178 dy/dx	0.157 dy/dx
Variable				
Remove Excuses	0.244*** (0.062)	0.178** (0.079)	0.417*** (0.117)	0.337*** (0.071)
Remove Monitor	0.108** (0.045)	0.080 (0.086)	0.008 (0.063)	0.105** (0.049)
Period #	−0.057*** (0.005)	−0.027*** (0.006)	−0.058*** (0.005)	−0.058*** (0.005)
Task1	−0.072** (0.033)	−0.063 (0.037)	−0.065* (0.034)	−0.072** (0.031)
Time varying social factors				
# Subjects remaining in period		0.053*** (0.010)		
# Subjects remaining × Remove Excuses		−0.012 (0.009)		
# Subjects remaining × Remove Monitor × unmonitored		−0.005 (0.009)		
Anyone left in prior periods			−0.121 (0.077)	
Anyone left in prior periods × Remove Excuses			−0.165** (0.057)	
Anyone left in prior periods × Remove Monitor			0.117 (0.087)	
# Subjects leaving in period				0.009 (0.008)
# Subjects leaving × Remove Excuses				−0.052*** (0.014)
# Subjects leaving × Remove Monitor				0.006 (0.012)
Demographic controls				
Male	−0.051* (0.030)	−0.086** (0.037)	−0.069** (0.032)	−0.048 (0.029)
Religious	0.011 (0.031)	0.041 (0.040)	0.025 (0.033)	0.010 (0.030)
Recent volunteer	0.016 (0.031)	0.023 (0.038)	0.037 (0.033)	0.018 (0.030)
Know other subjects	−0.013 (0.031)	−0.002 (0.042)	−0.023 (0.036)	−0.012 (0.030)
AIC	0.584	0.538	0.539	0.515
N	2299	2299	2299	2299

Standard errors are clustered by individuals.

Marginal effects after glm (Bernoulli distribution with complimentary log–log link function).

Periods are defined in minute intervals (0, 1–5, and 6–10).

Unrestricted subjects only.

\*\*\* Significant at 1%.

\*\* Significant at 5%.

\* Significant at 10%.

perception of the cost of time or the socially acceptable level of contribution. However we find that subjects' decisions in all treatments were highly sensitive to the immediate social environment (Table 4), which suggests that anchoring and framing from instructions read earlier were not major determinants of behavior.<sup>31</sup>

Could the increase of contributed time under Remove Excuses have been driven by conformity instead of image concerns? Subjects that are imitating each others' behavior would produce a similar pattern of departure regardless of the availability of excuses; the 'cascade' of departures would merely start earlier as the random mechanism induced

restricted subjects to leave. However, image concerned subjects would be less affected by the departure of others when excuses are available. This is because image consideration has less impact on decision making when excuses reduce the stigma of low contribution, and consequently, the potential gains from signaling.<sup>32</sup>

Examining the raw data, we see some evidence that departure patterns depend on the availability of excuses. In Remove Excuses, subjects seem unwilling to be the first to quit volunteering, but once someone leaves, a large fraction of subjects follow suit. On the other hand, subjects leave earlier when excuses are available, but seem less affected by others' departures. For example, 10 min after the first departure from the room, 49% of unrestricted subjects have left in Remove Excuses, compared to 16% when excuses are available.<sup>33</sup> This evidence suggests that stigma may not be linear in the amount of time volunteered. Below we provide a brief sketch of a possible 'bad apple' model, where an individual suffers disutility  $B$  from being the first person to stop working.

As before, let  $v$  be an agent's intrinsic motivation to volunteer. Let  $\Delta_C(t) = C(t) - C(t-1)$  be the increase in cost from working an additional minute at time  $t$ . Denote the image rewards as  $S(t|\delta)$ , whereas before  $\delta$  is the probability of external obstacles. Let the bad apple stigma be  $B > 0$ . Individual  $i$ 's utility for volunteering an extra minute is<sup>34</sup>:

$$U(t) = v - \Delta_C(t) + S(t|\delta)$$

where  $S(t|\delta) = 1 + (1 - \delta)B$  if no one has left, 1 otherwise

Before anyone has left, individuals continue to volunteer either because they are altruistic ( $v \geq \Delta_C(t-1)$ ) or because they are avoiding the bad apple stigma ( $\Delta_C(t) - (1 + (1 - \delta)B) < v < \Delta_C(t-1)$ ). Once someone leaves, this stigma is no longer a constraint, and those who only stayed to avoid  $B$  will depart immediately. The existence of unverifiable external circumstances ( $\delta$ ) lowers volunteering in two ways. First, it lessens the bad apple stigma to  $(1 - \delta)B$ . Second, it may induce some early departures that completely eliminate the bad apple stigma. Since this means fewer people are staying due to stigma avoidance, subjects are less likely to leave in clusters when excuses are available. On the other hand, individuals who are simply following the behavior of others are equally likely to leave in clusters in both treatments.<sup>35</sup> The differential impact of others' departures on an individual's likelihood of continuing distinguishes stigma avoidance from conformity.

We investigate the implications of the bad apple stigma with the duration model. Model 3 estimates the probability that a person continues to volunteer given 'Anyone left,' a binary variable that is 1 if someone has left the room. By itself, 'Anyone left' is negative but not significant, however, it is negative and significant when interacted with 'Remove Excuses.' In Model 4 we estimate the probability that subjects continue working given the number of departures within that time interval. Again, the coefficient for '# of subjects leaving' is not significant by itself, but is negative and significant when interacted with Remove Excuses. We find that when excuses are not available, subjects are 16.5% more likely to leave when someone else has left and 5% more likely to leave for every subject that leaves within

<sup>32</sup> The difference in sensitivity to others' departures will be largest on subjects with low altruism, who stand to gain the most in image rewards.

<sup>33</sup> The first unrestricted subject to leave the room volunteered an average of 27.7 min in Remove Excuses ( $se = 12.19$ ,  $n = 4$ ), 6 min in Baseline ( $se = 3.38$ ,  $n = 5$ ), and 9.75 min in Remove Monitor ( $se = 3.35$ ,  $n = 4$ ). Across the 9 excuses session, unrestricted subjects were the first to leave in 3 sessions. The departure times were minute 0, 1, and 15.

<sup>34</sup> Behavior in this model is not driven by expectations, so unlike the Benabou and Tirole's signaling model, no assumption about the distribution of altruism  $g(v)$  or common knowledge of this distribution among the agents is necessary. An agent's strategy specifies the optimal minutes to work before and after someone else has left.

<sup>35</sup> Goeree and Yariv (2007), Bernheim (1994).

<sup>31</sup> Mann–Whitney tests comparing survey responses indicated that the random time limit did not increase subjects preference for organizations that provide small compensation for volunteered time ( $z = 0.11$ ).

that time period. The marked increase in clustering behavior in the absence of excuses is not consistent with imitative behavior and is supportive of stigma avoiding behavior.

## 5. Conclusion

While a large body of literature addresses financial contributions, only a small literature exists on contributions of time and effort.<sup>36</sup> We focus on volunteering, the most common example of prosocial activity. In a typical volunteering environment, a representative from an organization orients and informally monitors a group of individuals, each of whom may be under external time restriction.

Motivated by recent theoretical and empirical studies showing that image concerns play a central role in prosocial behavior, we use an image signaling framework to investigate how each component of the social environment influences the contribution of time by volunteers. In particular, we hypothesize that the presence of a representative heightens agents' awareness of being observed, thus increasing time contributed, while the availability of excuses lowers time contributed by decreasing the stigma of low contributions.

We test these theoretical predictions with an experiment designed in partnership with School on Wheels, a nonprofit that tutors homeless children in Los Angeles. The nonprofit's own promotional material and volunteering task translate the core components of institutional volunteering into the laboratory. The laboratory setting allows time and effort to be precisely measured. Furthermore, the lab provides control over recruitment, task training, the presence of a monitor and external time restrictions.

Subjects contributed substantial time and effort in our experiment, producing several large databases of internet resources. The existence of a privately observed random time limit halved the average contribution of subjects who were unrestricted by the time limit. Subjects showed heightened sensitivity to others' departure in the absence of the random time limit: they were more likely to leave after someone else had left and were more likely to leave in clusters. These behavioral patterns are consistent with stigma avoidance and not with alternative mechanisms such as framing, anchoring, conditional cooperation or conformity.

In Section 4.4 find that individuals work more when working alongside others. While our experimental evidence suggests that subjects were highly attuned to the behavior of others, our design is unable to completely isolate image signaling concerns from concerns of fairness. For example, subjects may have perceived different time limitation as unfair and reacted negatively. We believe that is an interesting avenue for future research.

We manipulate the presence of the experimenter to test whether being observed passively by an authority figure reduces shirking. We find no increase in volunteering when the experimenter is present. The data suggests that the salient audience for signaling in this experiment may actually be peers: subjects are 5% more likely to continue volunteering for every peer that still remains in the room.

Volunteers' productivity remains largely unaffected by our image treatments. This suggests that image treatments can influence the observable component of labor (time) without altering the unobservable dimensions (productivity).

Our results illustrate that the social environment is an important factor in determining volunteer behavior. Creating an environment where external circumstances cannot be used to justify low contributions may increase the quantity of contributions without impacting their quality. This sheds some light on the effectiveness of common nonprofit practices. Asking for contributions of time or money in public (Soetevent

2005, Martin and Randal, 2008) prevents individuals from pretending that they were uninformed about the opportunity to contribute. Precommitting contributions (such as monetary pledges) makes it hard to claim prior commitments when the time to give comes. However the strategy of eliminating excuses is markedly less effective once a single bad apple openly stops contributing. While social image can be manipulated to increase prosocial behavior, the success of this approach is sensitive to the details of the social environment.

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## Appendix A

### Proofs

**Lemma 5.1.**  $\Delta(v^*|\delta, x)$  is increasing in  $v^*$ .

**Proof.** Let  $[v_L, v_H] \in \mathbb{R}_+$  indicate the interval from which  $v$  is drawn. By Proposition 6 (Benabou and Tirole, 2006), the assumption that  $g(v)$  is decreasing implies that  $\Delta(v|\delta, x)$  is increasing in  $v^*$  when  $\delta = 0$ . Since  $\Delta(v^*|\delta, x)$  is composed of only  $M^+$  and  $M^-$ , and  $M^+$  is unaffected by  $\delta$ , we only need to show that the slope of  $M^-$  when  $\delta > 0$  lies beneath the slope of  $E(v|v < v^*)$ .

Let  $f(v) \equiv E(v|v < v^*)$  and  $f'(v)$  be its derivative. Let  $f_H \equiv E(v|v \leq v_H) = E(v)$ . Also define  $e(v^*) \equiv \delta + (1 - \delta)G(v^*)$  and  $h(v^*) \equiv \frac{(1 - \delta)G(v^*)}{e(v^*)}$ . Rewrite  $M^-(v|\delta) = \delta f_H e(v^*)^{-1} + h(v^*)f(v^*)$  and take its derivative:

$$\frac{\partial M^-(v^*|\delta)}{\partial v} = -\frac{\delta f_H}{e(v^*)^2} + h'(v^*)f(v^*) + h(v^*)f'(v^*) \quad (4)$$

Taking the derivate of  $h(v^*)$  and substituting in  $e(v^*)$  we get:

$$h'(v^*) = \frac{(1 - \delta)G'(v^*)e(v^*) - (1 - \delta)G(v^*)e'(v^*)}{e(v^*)^2} = \frac{(1 - \delta)G'(v^*)\delta}{e(v^*)^2} \quad (5)$$

Substituting Eq. (5) into Eq. (4) and simplifying, we are left to show that:

$$\frac{\delta(1 - \delta)G'(v^*)f(v^*) - \delta f_H}{e(v^*)^2} < f'(v^*)(1 - h(v^*))$$

Since  $0 < h(v^*) < 1$  and  $f'(v^*) > 0$ ,  $f'(v^*)(1 - h(v^*)) > 0$ . Since by assumption  $g'(v^*) < 0$ ,  $(1 - \delta)G'(v^*)f(v^*) < f_H$ , which implies that the slope of  $M^-(v^*|\delta > 0)$  is smaller than  $M^-(v^*|\delta = 0)$ . Hence  $\Delta(v^*|\delta > 0, x)$  must be increasing in  $v^*$ .  $\square$

**Lemma 5.2.** Let  $\bar{a}(\delta, x) \equiv N(1 - G(v^*))$  denote the total participation among a population of  $N$  individuals.

(i) Removing excuses increases participation.

$$0 = \delta < \delta' \Rightarrow \bar{a}(\delta, x) > \bar{a}(\delta', x)$$

<sup>36</sup> Some examples of studies of financial contribution include Harbaugh (1998), Karlan and List (2007), Landry et al. (2006) and Shang and Croson (forthcoming). Studies in labor contribution include Gneezy and Rustichini (2000), Ariely et al. (2009) and Carpenter and Myers (2007).



(ii) Reduced monitoring decreases participation.

$$0 < x < x' \Rightarrow \bar{a}(\delta, x) < \bar{a}(\delta, x')$$

**Proof.** (i) Let  $v'$  the solution to  $v + \Delta(v|\delta', x) - C = 0$ . Honor remains unchanged by excuses while stigma is lowered, hence  $\Delta(v|\delta', x) < \Delta(v|\delta, x)$ . When excuses become unavailable  $v' + \Delta(v'|\delta, x) - C > 0$ , which implies  $v'$  will still participate. By Lemma 1 we know that  $\Delta(v^*|\delta, x)$  increases in  $v^*$ , hence the new cutoff type  $v^*$  whom is now indifferent about volunteering must be a lower type. Since participation is decreasing in type,  $v^* < v'$  implies higher total participation when  $\delta = 0$ .

(ii) Let  $v'$  the solution to  $v + \Delta(v|\delta, x') - C = 0$ . When visibility is decreased,  $v' + \Delta(v'|\delta, x) - C < 0$  hence type  $v'$  will no longer participate. By Lemma 1 we know that  $\Delta(v^*|\delta, x)$  increases in  $v^*$ , hence the new cutoff cannot be smaller than  $v'$ . Hence  $v^* > v'$ , and since participation is decreasing in type, this implies lower total participation.  $\square$

We now extend this binary participation model to our volunteering setup. Suppose there is  $t$  level of contributions from 1 min up to a maximum of  $T$  minutes. Let  $C(t)$  be the cost function for contribution level  $t$  where  $C'(t) \geq 1$  (costs do not decrease over time). Let  $v_t^*$  be the threshold type for participation level  $t$ . Individuals contribute at level  $t$  if:

$$u(t) = vt - C(t) + \Delta(v_t^*|\delta, x) \geq 0$$

Treating each individual as facing  $t$  binary participation decision, let  $v^* = (v_1^*, \dots, v_t^*, \dots, v_T^*)$  be the equilibrium threshold types induced by environment  $(\delta, x)$ . We show that higher levels of participation induce strictly higher thresholds than lower levels of participation; in other words individuals who do not choose to volunteer in level  $t$  will also not participate in level  $t'$  where  $t' > t$ . The monotonicity of  $v_t^*$  allows total time volunteered to be computed in intervals. This allows us to extend Lemma 2 to  $t$  levels of contribution.

**Lemma 5.3.** Level  $t$  threshold type  $v_t^*$  is strictly higher than level  $t-1$  threshold type  $v_{t-1}^*$ .

**Proof.** The utility of the cutoff type at each level is zero:

$$v_t t - C(t) + \Delta(v_t^*|\delta, x) = v_{t-1}^* (t-1) - C(t-1) + \Delta(v_{t-1}^*|\delta, x) = 0$$

Note that  $v_t^* = \frac{C(t) - \Delta(v_t^*|\delta, x)}{t}$ . Subtracting the utilities we get:

$$(v_t^* - v_{t-1}^*)(t-1) + v_t^* - (C(t) - C(t-1)) + \Delta(v_t^*|\delta, x) - \Delta(v_{t-1}^*|\delta, x) = 0 \quad (6)$$

Substituting  $v_t^*$  into Eq. (6) and simplifying we arrive at:

$$\begin{aligned} (v_t^* - v_{t-1}^*)(t-1) + \Delta(v_t^*|\delta, x) - \Delta(v_{t-1}^*|\delta, x) \\ = \frac{\Delta(v_t^*|\delta, x)}{t} + C(t) - C(t-1) - \frac{C(t)}{t} \quad \square \end{aligned}$$

From the assumption that  $C'(t) \geq 1$ ,  $C(t) - C(t-1) - \frac{C(t)}{t} \geq 0$ . Since  $\frac{\Delta(v_t^*|\delta, x)}{t} > 0$  the entire right hand expression is positive. By Lemma 1 we know that  $\Delta(v^*|\delta, x)$  increases in  $v$ , hence  $v_t^*$  can't be smaller than  $v_{t-1}^* < 0$  since this implies  $\Delta(v_t^*) - \Delta(v_{t-1}^*) < 0$  and that the left hand expression is negative. Hence  $v_t^* > v_{t-1}^*$ .  $\square$

**Proposition 5.4.** In a volunteering setup involving  $T$  levels of participation,

- (i) Excuses Prediction: removing excuses increases time volunteered.
- (ii) Monitoring Prediction: reduced monitoring decreases time volunteered.

**Proof.** (i) As before let  $0 = \delta < \delta'$ . Let  $v' = (v'_1, \dots, v'_t, \dots, v'_T)$  denote the vector of cutoff types induced by environment  $(\delta', x)$  while  $v^* = (v_1^*, \dots, v_t^*, \dots, v_T^*)$  denotes the vector of cutoff types induced by environment  $(\delta, x)$ . Hence  $v_t$  is the solution to  $v_t t + \Delta(v_t|\delta', x) - C(t) = 0$  while  $v_t^*$  solves  $v_t t + \Delta(v_t|\delta, x) - C(t) = 0$ . Following the proof of the binary case Lemma 2(i) we arrive at  $v_t^* < v_t$ . Letting  $N$  be the total number of agents in the population, total time volunteered is:

$$\bar{a}_T(\delta, x) \equiv N \sum_{t=1}^{T-1} t(G(v_{t+1}^*) - G(v_t^*))$$

This implies that  $\bar{a}_T(\delta, x) > \bar{a}_T(\delta', x)$ .

- (ii) Using same steps and application of Lemma 2(ii) we show that  $\bar{a}_T(\delta, x) < \bar{a}_T(\delta, x')$  for  $0 < x < x'$ .  $\square$

**Appendix A Table 1.**

Duration Model (All Subjects).

	Model 1	Model 2	Model 3	Model 4
Probability of working	0.128	0.156	0.141	0.125
Variable	dy/dx	dy/dx	dy/dx	dy/dx
Remove Excuses	0.197*** (0.058)	0.139* (0.079)	0.381** (0.119)	0.273*** (0.070)
Remove Monitor	0.079** (0.022)	0.057 (0.071)	0.025 (0.045)	0.068* (0.037)
Period #	- (0.036*** (0.004)	-0.010* (0.005)	- (0.036*** (0.004)	- (0.038*** (0.004)
Task1	-0.045* (0.025)	-0.031 (0.029)	-0.039 (0.027)	-0.045* (0.024)
Remaining periods before time limit	0.011*** (0.002)	0.015*** (0.003)	0.012*** (0.003)	0.011*** (0.002)
<i>Time varying social factors</i>				
# subjects remaining in period		0.039*** (0.008)		
# subjects remaining × Remove Excuses		-0.003 (0.007)		
# subjects remaining × Remove Monitor		-0.003 (0.007)		
Anyone left in prior periods			-0.027* (0.042)	
Anyone left in prior periods × Remove Excuses			- (0.127*** (0.035)	
Anyone left in prior periods × Remove Monitor			0.018 (0.047)	
# subjects leaving in period				-0.001 (0.007)
# subjects leaving × Remove Excuses				-0.036** (0.011)
# subjects leaving × Remove Monitor				0.009 (0.010)
<i>Demographic controls</i>				
Male	-0.032 (0.023)	-0.054* (0.029)	-0.041* (0.024)	-0.030 (0.022)
Religious	0.009 (0.023)	0.032 (0.030)	0.018 (0.024)	0.009 (0.022)
Recent Volunteer	0.003	0.004	0.015	0.004

(continued on next page)

Table 1 (continued)

	Model 1	Model 2	Model 3	Model 4
Demographic controls	(0.023)	(0.029)	(0.024)	(0.022)
Know other subjects	-0.008	-0.031	-0.015	-0.008
	(0.024)	(0.029)	(0.028)	(0.024)
AIC	0.607	0.541	0.547	0.516
N	2964	2964	2964	2964

Standard errors are clustered by individuals.

Marginal effects after glm (Bernoulli distribution with complimentary log-log link function).

Periods are defined in minute intervals (0, 1–5, 6–10).

\* Significant at 10%; \*\* Significant at 5%; \*\*\* Significant at 1%.

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