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# Signaling Cooperation

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## Non-Technical Summary

An increasing share of productive activities take place in teams. Working in teams allows complementary knowledge and skills to be combined, which can result in outcomes a single person would not achieve. However, since individual contributions to the team output are typically not verifiable, effective teamwork may be impeded by free riders. Free-riding also reduces the effectiveness of team incentives. Thus, if employees' cooperation in teams is important for an organization, it may want hire individuals who are not free riders, but instead are willing to contribute to a common good.

What can an organization do in order to find such employees? In job interviews and assessment centers, all applicants can cheaply pretend to be team players. Nevertheless, an applicant's vita may provide substance to such claims. For example, if an applicant voluntarily engages in activities that are primarily done to help needy individuals, this could reveal that she is not only interested in her own benefit, but also cares about the well-being of others. This characteristic may make her more likely to contribute to future teamwork, even if the goal of the teamwork project is unrelated to the cause of the volunteering activity. Thus, social engagement may credibly signal an applicant's willingness to cooperate in teams to potential employers. This is the hypothesis that we test in this paper.

We conduct two experiments to detect the signaling value of social engagement and other activities, such as volunteering in students or sports associations. In the first experiment (Study 1), we collect student subjects' current résumés and measure their behavior in a linear public goods game (PGG). In the second experiment (Study 2), we ask human resource managers from different firms and industries to predict the behavior of Study 1 subjects in the PGG, based on their résumés. To identify the impact of extracurricular activities on beliefs, we randomly vary the résumés content. To elicit beliefs in an incentive-compatible manner, the managers' payoff increases in the precision of their predictions. The advantage of this experimental design is that it closely links subjects' behavior and others' beliefs about behavior.

Around 20 percent of our 347 subjects in Study 1 present some sort of social engagement on their résumés. It is one of the most commonly mentioned types of extracurricular activities. In order to get an objective measure for the intensity of engagement, we recruited subjects who are uninformed about the experiment and asked them to rate for a given activity the intensity of engagement. The average rating is the measure of intensity of engagement we use in our analysis.

The data from Study 1 show that subjects' willingness to cooperate increases in their degree of social engagement. Subjects who indicate social engagement on their résumés, but are in the lowest or second-lowest quartile of the social intensity score distribution, do not behave significantly different than subjects without any social engagement. Subjects with social engagement in the third (fourth) quartile of the social intensity score distribution contribute 30 percent (40 percent) more than subjects without social engagement. Importantly, the

differences in behavior cannot be explained by differing beliefs. On average, subjects' beliefs about their opponents' contributions equal the level of their own contributions. However, subjects in the third and fourth quartile of the social intensity score distribution expect to contribute significantly more than their opponents. In a control experiment, we replicate our main findings and rule out that they are driven by demand or priming effects through the collection of résumés.

Subjects engaged in student or sports associations do not contribute more in the PGG than non-engaged subjects. Other items on the résumé, such as age, gender, field of studies or the industry in which a subject collected professional experience, are mostly not informative about contributions in the PGG.

Employers largely anticipate the relative behavioral differences. When the human resource managers in our sample have to predict behavior based on résumé content that does not contain extracurricular activities, socially engaged subjects are expected to behave like subjects active in student associations (once we control for gender). However, if résumé content includes extracurricular activities, they expect socially-engaged subjects to contribute around 30 percent more in the PGG than all other subjects; for subjects in the first, second, third and fourth quartile, the difference is plus 15, 25, 30 and 50 percent, respectively. Low-degree social engagement therefore gets an undeserved bonus. In contrast, the intensity of engagement in student or sports associations has no positive effect on beliefs.

The results from the two studies taken together demonstrate that intensive social engagement credibly signals the willingness to cooperate in teams to potential employers. In line with job market signaling theory, producing the signal is costly. The activities that receive high social intensity scores almost always involve working in positions with a high degree of commitment and responsibility for needy people. The information that has to be provided to achieve a high social intensity score comprises many details, including precise data on the time frame and the organization at which the engagement took place. Such information is not cheap talk. Like educational achievements, it is verifiable by third parties. We therefore conclude that a young professional's vita not only signals productivity through education, but also important behavioral characteristics through the choice of her extracurricular activities.

# Signaling Cooperation\*

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## Abstract

We examine what an applicant's vita signals to potential employers about her willingness to cooperate in teams. Intensive social engagement may credibly reveal that an applicant cares about the well-being of others and therefore is less likely to free-ride in teamwork situations. We find that contributions in a public goods game strongly increase in a subject's degree of social engagement as indicated on her résumé (and rated by an independent third party). Engagement in other domains, such as student or sports associations, is not positively correlated with contributions. In a prediction experiment with human resource managers from various industries, we find that managers use résumé content effectively to predict relative differences in subjects' willingness to cooperate. Thus, young professionals signal important behavioral characteristics to potential employers through the choice of their extracurricular activities.

**Keywords:** Signaling, Public Goods, Labor Markets, Extracurricular Activities

**JEL Classification:** C72, C92, D82

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*“Volunteers don’t necessarily have the time; they just have the heart.”*

Elizabeth Andrews

## 1 Introduction

An increasing share of productive activities take place in teams (e.g., Lazear and Shaw 2007). Working in teams allows complementary knowledge and skills to be combined, which can result in outcomes a single person would not achieve. However, since individual contributions to the team output are typically not verifiable, effective teamwork may be impeded by free riders. Free-riding also reduces the effectiveness of team incentives (Holmström 1982, Nalbantian and Schotter 1997). Thus, if employees’ cooperation in teams is important for an organization, it may want hire individuals who are not free riders, but instead are willing to contribute to a common good.

What can an organization do in order to find such employees? In job interviews and assessment centers, all applicants can cheaply pretend to be team players. Nevertheless, an applicant’s vita may provide substance to such claims. For example, if an applicant voluntarily engages in activities that are primarily done to help needy individuals, this could reveal that she is not only interested in her own benefit, but also cares about the well-being of others. This characteristic may make her more likely to contribute to future teamwork, even if the goal of the teamwork project is unrelated to the cause of the volunteering activity. Thus, social engagement<sup>1</sup> may credibly signal an applicant’s willingness to cooperate in teams to potential employers. This is the hypothesis that we test in this paper.

We conduct two experiments to detect the signaling value of social engagement and other activities, such as volunteering in students or sports associations. In the first experiment (Study 1), we collect student subjects’ current résumés and measure their behavior in a linear public goods game (PGG). In the second experiment (Study 2), we ask human resource managers from different firms and industries to predict the behavior of Study 1 subjects in the PGG, based on their résumés. To identify the impact of extracurricular activities on beliefs, we randomly vary the résumé content. To elicit beliefs in an incentive-compatible manner, the managers’ payoff increases in the precision of their predictions. An activity credibly signals an applicants’ willingness to cooperate if both contributions in the PGG, and managers’ predictions about contributions are positively related to subjects’ degree of engagement in this activity.

The advantage of this experimental design is that it closely links subjects’ behavior and others’ beliefs about behavior. A well-known alternative experimental method would be

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<sup>1</sup>We define social engagement as voluntary, unpaid engagement without any political context for individuals who are in difficult conditions or in special need of help and support.

to send out fictitious applications to employers, and then to examine the relationship between résumé content and invitations to job interviews (e.g., Bertrand and Mullainathan 2004). However, with this method, one could not identify the signaling value of social engagement with respect to cooperation. An applicant who exhibits intensive social engagement besides her studies may not only signal a concern for others, but also that she is productive enough to perform both activities at the same time. Alternatively, employers may value the applicant’s experience from the engagement. Thus, if subjects with social engagement on their résumé get more job interviews, the driver of this result would remain unclear. We avoid this problem by directly measuring human resource managers’ beliefs about subjects’ behavior in the PGG. The PGG has a number of advantages: It provides a clean and widely used measure for the willingness to cooperate (in contrast, field outcomes may be confounded by other behavioral motives); it is easy to explain the players’ incentives in this game; and it has been shown that behavior in the PGG predicts cooperative group behavior in the field.<sup>2</sup>

Around 20 percent of our 347 subjects in Study 1 present some sort of social engagement on their résumé. It is one of the most commonly mentioned types of extracurricular activities (21 percent show engagement in student associations, 9 percent engagement in sports associations). Subjects are engaged in various activities that differ in tasks, frequency, time spent with the activity, type of organization, location, clients, and the hierarchical position in the organization. Some activities on the résumés may reflect only limited commitment (e.g., “three weeks volunteering project in the seniors residence XY; renovation of the house, helping seniors”), while others indicate dedicated engagement (e.g., “full-time voluntary social year in the organization XY for disabled people; providing part-time support to a family with a disabled child for 2.5 years”). To get an objective measure for the intensity of engagement, we recruited subjects who are uninformed about the experiment and asked them to rate for a given activity the intensity of engagement. The average rating is the measure of intensity of engagement we use in our analysis. For the domain of social engagement, we call this measure the “social intensity score.” For example, the social intensity score for the three-week volunteering project mentioned above is 2.36 (on a scale between 1 and 10), and 7.25 for the years of work with disabled individuals.

The data from Study 1 show that subjects’ willingness to cooperate increases in their degree of social engagement. Subjects who indicate social engagement on their résumé, but

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<sup>2</sup>Rustagi et al. (2010) find that rural communities (in Ethiopia) with a higher share of cooperators are more successful in forest commons management than communities with a smaller share of these types. Englmaier and Gebhardt (2011) hire subjects to work temporarily at a university library and subsequently invite them to a PGG laboratory study. They find that productivity on the job is positively correlated with contributions in the PGG. Algan et al. (2014) show that the behavior of software developers in PGGs predicts their contributions to open source software projects.

are in the lowest or second-lowest quartile of the social intensity score distribution, do not behave significantly different than subjects without any social engagement. Subjects with social engagement in the third (fourth) quartile of the social intensity score distribution contribute 30 percent (40 percent) more than subjects without social engagement. Importantly, the differences in behavior cannot be explained by differing beliefs. On average, subjects' beliefs about their opponents' contributions equal the level of their own contributions. However, subjects in the third and fourth quartile of the social intensity score distribution expect to contribute significantly more than their opponents. In a control experiment, we replicate our main findings and rule out that they are driven by demand or priming effects through the collection of résumés.

Subjects engaged in student or sports associations do not contribute more in the PGG than non-engaged subjects. Other items on the résumé, such as age, gender, field of studies or the industry in which a subject collected professional experience, are mostly not informative about contributions in the PGG.

Employers largely anticipate the relative behavioral differences. When the human resource managers in our sample have to predict behavior based on résumé content that does not contain extracurricular activities, socially engaged subjects are expected to behave like subjects active in student associations (once we control for gender). However, if résumé content includes extracurricular activities, they expect socially-engaged subjects to contribute around 30 percent more in the PGG than all other subjects; for subjects in the first, second, third and fourth quartile, the difference is plus 15, 25, 30 and 50 percent, respectively. Low-degree social engagement therefore gets an undeserved bonus. In contrast, the intensity of engagement in student or sports associations has no positive effect on beliefs. These results can be generalized. When we replicate the prediction experiment with student subjects, we find similar average predictions. Thus, it seems to be general knowledge that the degree of social engagement is informative about one's willingness to cooperate, while other items on the résumé mostly are not.

The results from the two studies taken together demonstrate that intensive social engagement credibly signals the willingness to cooperate in teams to potential employers. In line with Spence (1973) job market signaling (and Elizabeth Andrews' quote above), producing the signal is costly. The activities that receive high social intensity scores almost always involve working in positions with a high degree of commitment and responsibility for needy people (see Subsection 6.5 for details). The information that has to be provided to achieve a high social intensity score comprises many details, including precise data on the time frame and the organization at which the engagement took place. Such information is not cheap talk. Like educational achievements, it is verifiable by third parties. We therefore conclude that a young professional's vita not only signals productivity through education, but also important behavioral characteristics through

the choice of her extracurricular activities.

The paper is organized as follows. In Section 2, we relate our contribution to the literature. In Section 3, we build a simple social preference model and show that social engagement signals the willingness to cooperate in teams, regardless of the presence of strategic motives. In Section 4, we explain the design of the various components of the experiment. In Section 5, we describe the results for each study. In Section 6, we present a number of robustness checks and further results. Section 7 concludes and discusses potential avenues for future research. An extensive Online Appendix contains all instructions and additional robustness checks.

## 2 Related Literature

**Screening versus signaling of motivation.** There are two contractual mechanisms that reveal private information: screening and signaling. Over the past decade, motivational screening has received substantial attention by theorists and empirical researchers. The basic idea behind motivational screening is that an organization may be able to attract motivated workers by offering both low monetary incentives and some kind of non-monetary incentive, such as the mission of the organization (Akerlof and Kranton 2005, Besley and Ghatak 2005, Francois 2007, Auriol and Brilon 2014) or a cooperative work environment (Delfgaauw and Dur 2007, Dur 2009, Kosfeld and von Siemens 2009, 2011). Depending on the applicant's outside options, the application at such an organization then may reveal that she not only cares about monetary rewards, but also about the non-monetary incentives that the organization offers.<sup>3</sup>

In practice, motivational screening through low monetary rewards may be problematic for an organization as it could deter high ability individuals from applying and working there. Moreover, monetary rewards do not necessarily crowd out intrinsic motivation. Dal Bo et al. (2014) show that the pool of applicants for public sector jobs can also be improved through higher wages, both in terms of cognitive ability and public sector motivation. Ashraf et al. (2014) analyze the impact of several incentive contracts on health worker performance. They find that monetary incentives do not crowd-out public service motivation. Instead, there is even a positive interaction effect between financial

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<sup>3</sup>There is limited empirical evidence on motivational screening. Burgess and Metcalfe (1999) show that the public sector provides fewer performance incentives than private firms; Leete (2000) finds that wage differentials between employees are muted in non-profit organizations; and Gregg et al. (2011) show that employees in the non-profit sector work significantly more unpaid overtime than respective workers in the for-profit sector. These studies however provide no evidence on the substitutability of monetary and non-monetary incentives. Aimone et al. (2013) show in a lab experiment using the PGG that conditional cooperators are more likely to self-select into groups in which they have to sacrifice a share of their private returns, while most free riders are not ready to make this sacrifice and end up in groups mainly consisting of free riders. Carpenter and Gong (2016) and Gerhards (2015) provide experimental evidence that some workers are motivated by their organization's mission.



incentives and motivation.

This paper introduces motivational signaling as an alternative to motivational screening that avoids the potential costs of low financial incentives for the organization. The costs of signaling are borne by the applicant. These are not necessarily monetary costs. The social engagement that matters in the job market for young professionals takes place during adolescence and early adulthood, i.e., when market wages are still low. However, individuals could use their free time for many different pleasant activities, such as traveling, playing sports or spending time with friends. Thus, the opportunity costs of social engagement are high, and the benefits may outweigh the costs only if the individual sufficiently cares about others.

**Volunteering.** A number of papers analyze the economic causes and consequences of volunteering.<sup>4</sup> Menchik and Weisbrod (1987) build and test labor market models in which the motivation for volunteering is either extrinsic (i.e., investments into human capital) or intrinsic (i.e., a consumption good). Freeman (1997) shows that those who volunteer on average have comparatively high skills and high opportunity costs of time. Meier and Stutzer (2008) provide evidence that volunteers are more satisfied with their life than non-volunteers. Carpenter and Myers (2010) study the motivation of volunteer firefighters and find that they are motivated both by altruism and image concerns. Xiao and Houser (2014) show that the extent of volunteering can be altered by making its benefits salient to subjects. Our paper is the first to empirically examine the signaling value of social engagement to employers. It thereby provides a more nuanced view on volunteering. While intensive social engagement credibly signals the willingness to cooperate, other activities like engagement in sports and student associations have no such effect.

**Empirical approaches to job market signaling.** A small empirical literature examines whether there is evidence for Spence (1973) job market signaling using observational data, see Wolpin (1977), Lang and Kropp (1986), and Bedard (2001). The latter two papers find patterns in educational choices that are consistent with signaling theory but cannot be explained by human capital theory. We complement this literature by analyzing which behavioral characteristics an applicant's vita signals to employers. Importantly, our data allow us to reject the hypothesis that employers' beliefs about subjects' willingness to cooperate are driven by a pure treatment effect. Subjects with (paid) professional experience in social work contribute (and are predicted to contribute) only slightly more than subjects who were not socially engaged. Thus, socially engaged

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<sup>4</sup>In this literature, volunteering usually is defined as the provision of labor without monetary compensation.

subjects receive higher predictions because they choose their activity voluntarily without getting any compensation, not because of the activity itself.<sup>5</sup>

### 3 Signaling cooperation through social engagement

We build a simple social preference model and apply it to two economic situations, a team production problem and the choice of social engagement. The preference model only uses arguments that are standard in the social preference literature. Under mild restrictions, there is a positive relationship between the degree of social engagement and cooperation in the team production problem – even if the two activities (and the people who benefit from it) are completely unrelated. This effect is independent from the extent to which the labor market rewards social engagement.

**Utility framework.** Consider a game with a finite number of agents. Agent  $i$ 's utility in this game depends on her own (monetary) payoff  $m_i$  and the payoffs  $\{m_j\}_{j \neq i}$  of the other parties  $j$  that are affected by agent  $i$ 's actions. Her utility function is given by<sup>6</sup>

$$u_i = \sqrt{m_i} + \sum_{j \neq i} \theta_i \gamma_{i,j} m_j. \quad (1)$$

The parameter  $\theta_i \geq 0$  denotes agent  $i$ 's “social preference type,” which is invariant across games. If  $\theta_i = 0$ , agent  $i$  is only interested in her own material payoff; if  $\theta_i > 0$ , she cares about the well-being of others. The parameter  $\gamma_{i,j} \geq 0$  captures to what extent agent  $i$  cares about party  $j$  in particular. This parameter (potentially) depends on the identity, endowments and preferences of party  $j$ .<sup>7</sup> Thus, the model allows for agents who in general are altruistic ( $\theta_i > 0$ ) but have no concerns for the well-being of another party ( $\gamma_{i,j} = 0$ ), for example, if this party is already doing very well or is known to be selfish. Alternatively, an agent may be relatively selfish ( $\theta_i$  small) but cares a lot about the well-being of a particular party  $j$  ( $\gamma_{i,j}$  large). For each agent, the preference parameters are drawn from a joint probability distribution  $F(\theta, \gamma)$ , where  $\gamma$  is vector that captures the valuation for all parties. We assume that the associated density  $f(\theta, \gamma)$  is continuous in both arguments, strictly positive for all  $\theta, \gamma$ , and that  $\theta$  and  $\gamma$  are independent.

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<sup>5</sup>There is also a large experimental literature that examines the equilibrium selection in signaling games, e.g., Brandts and Holt (1992), Cooper et al. (1997), and Kübler et al. (2008). In these papers, the signaling mechanism is part of the experiment, i.e., subjects choose their “education” in the experiment.

<sup>6</sup>The non-linear specification is chosen to allow for interior solutions; the asymmetry in the curvature between own and others' payoffs is chosen for convenience and not essential for the model.

<sup>7</sup>The utility function therefore combines two modeling strategies. The social preference parameter  $\theta_i$  is used in Ellingsen and Johannesson's (2008) model of social esteem. The parameter  $\gamma_{i,j}$  is used in Cox et al. (2007) to denote an “emotional state” that may depend on party  $j$ 's kindness.

**Cooperation in teams.** Consider the following teamwork production problem (or PGG) with three agents  $i = 1, 2, 3$ . Each agent holds 20 tokens, which she can either keep for herself or contribute to the project of the team. Let  $g_i$  be the contribution of agent  $i$ . The material payoff of agent  $i$  is then

$$m_i = 20 - g_i + \alpha \sum_{j=1}^3 g_j, \quad (2)$$

where  $\alpha$  indicates the rate at which contributions are translated into payoffs. The three agents have no information about each other's preference parameters (they only know the distribution  $F$ ). Agent  $i$ 's concern for the other two agents is given by  $\bar{\gamma}_i = \gamma_{i,j}$  for each  $j \neq i$ .

We show that a Bayesian equilibrium exists in this game and characterize it. Let  $\Gamma(g)$  be a distribution over contributions (induced by  $F$  and some pure strategy profile) with mean  $E[g]$ . Then we can find a number  $CE \in [0, 20]$  – a certainty equivalent – so that agent  $i$ 's expected utility from contribution  $g_i$  is given by

$$E[u_i] = \sqrt{20 - g_i + \alpha g_i + 2\alpha CE} + 2\bar{\gamma}_i \theta_i (20 + 2\alpha E[g] - E[g] + \alpha g_i). \quad (3)$$

This expected utility function is concave in the agent's action. Hence, a Bayesian equilibrium in pure strategies exists (Meirowitz 2003). An interior best-response is characterized by the first-order condition

$$g_i^* = \frac{20 + 2\alpha CE}{1 - \alpha} - \frac{1 - \alpha}{(4\bar{\gamma}_i \theta_i \alpha)^2}. \quad (4)$$

Observe that contributions increase in  $\theta_i$ . For given  $\bar{\gamma}_i$ , there exist values  $\theta_H(\bar{\gamma}_i), \theta_L(\bar{\gamma}_i)$  with  $\theta_H(\bar{\gamma}_i) > \theta_L(\bar{\gamma}_i) > 0$  so that in this equilibrium player  $i$  does not contribute anything to the public good if  $\theta_i < \theta_L(\bar{\gamma}_i)$ , contributes the amount  $g_i^*$  as indicated in equation (4) if  $\theta_L(\bar{\gamma}_i) \leq \theta_i \leq \theta_H(\bar{\gamma}_i)$ , and contributes the maximal amount of 20 tokens if  $\theta_i > \theta_H(\bar{\gamma}_i)$ . Since  $\theta$  and  $\gamma$  are independent, we conclude that *on average an agent's contribution in the teamwork production problem increases in her social preference type*.

**The choice of social engagement.** Consider now an agent  $i$  who decides on how much of her leisure time she wants to work for a disadvantaged party  $j$  in her community. When she chooses the level of engagement  $e_i \in [0, 1]$ , she creates a benefit worth  $m_j = e_i$  for party  $j$ , but has less time to spend on other activities. Her time spent on leisure produces an utility of  $\sqrt{1 - e_i}$  so that her total utility is given by

$$u_i = \sqrt{m_i} + \sqrt{1 - e_i} + \theta_i \gamma_{i,j} m_j. \quad (5)$$

Social engagement produces a verifiable signal that the agent communicates to the labor market. Firms may value the agent’s experience and/or the signal about her behavioral characteristics. Let  $m_i(e_i)$  be the agent’s wage if her level social engagement is  $e_i$ . Suppose that the labor market equilibrium implies  $m_i'(e_i) \geq 0$  and  $m_i''(e_i) \leq 0$  (i.e., the labor market may also choose not to reward social engagement). The agent then chooses  $e_i$  to maximize her total utility  $u_i(m_i(e_i), m_j(e_i))$ . The first-order condition that characterizes the unique interior solution for optimal social engagement is given by

$$\frac{m_i'(e_i^*)}{\sqrt{m_i(e_i^*)}} + 2\gamma_{i,j}\theta_i = \frac{1}{\sqrt{1 - e_i^*}}. \quad (6)$$

This equation captures that there are three different motivations for social engagement: first, a strategic motive when more engagement increases the agent’s wage; second, the agent’s “mission motivation” as captured by her concerns for the disadvantaged party  $\gamma_{i,j}$ ; and third, the agent’s concern for the well-being of others as captured by her social preference type  $\theta_i$ . The assumption on  $m_i$  ensures that for given concerns about the disadvantaged party  $\gamma_{i,j}$ , higher social preference types show more social engagement. Since  $\theta$  and  $\gamma$  are independent, we conclude that *on average an agent’s degree of social engagement increases in her social preference type*.

The first-order condition in (6) is informative about how common social engagement should be in the agent population. If the level of engagement does not change wages too much,  $m_i'(0) \leq \sqrt{m_i(0)}$ , then, for given  $\gamma_{i,j}$ , agent  $i$  will show no engagement at all when her social preference type is below some threshold and positive engagement otherwise. In this case, the population will consist of a fraction of agents who are not socially engaged and a fraction of agents who exhibit varying degrees of engagement. However, if engagement sufficiently increases wages,  $m_i'(0) > \sqrt{m_i(0)}$ , each agent exhibits some positive degree of social engagement.

**Predictions.** Agent  $i$ ’s behavior in the team production problem and her choice of social engagement both depend on her social preference type  $\theta_i$ . Consequently, her contribution in the team production problem is positively correlated with her level of social engagement. While the agent’s type is her private information, the level of social engagement is verifiable by a third party. Thus, the level of social engagement can inform a third party about the willingness to cooperate in teams. We therefore have the following hypotheses.

**Hypothesis 1.** *On average, agents’ contributions in the team production problem increase in their degree of social engagement.*

**Hypothesis 2.** *The beliefs of a third party about agents’ contributions in the team production problem increase in their degree of social engagement.*

## 4 Study Design

In order to test the two hypotheses, we create four datasets: “Study 1,” the “Evaluation Survey,” “Study 2A” and “Study 2B.” Figure 1 provides an overview of the project.

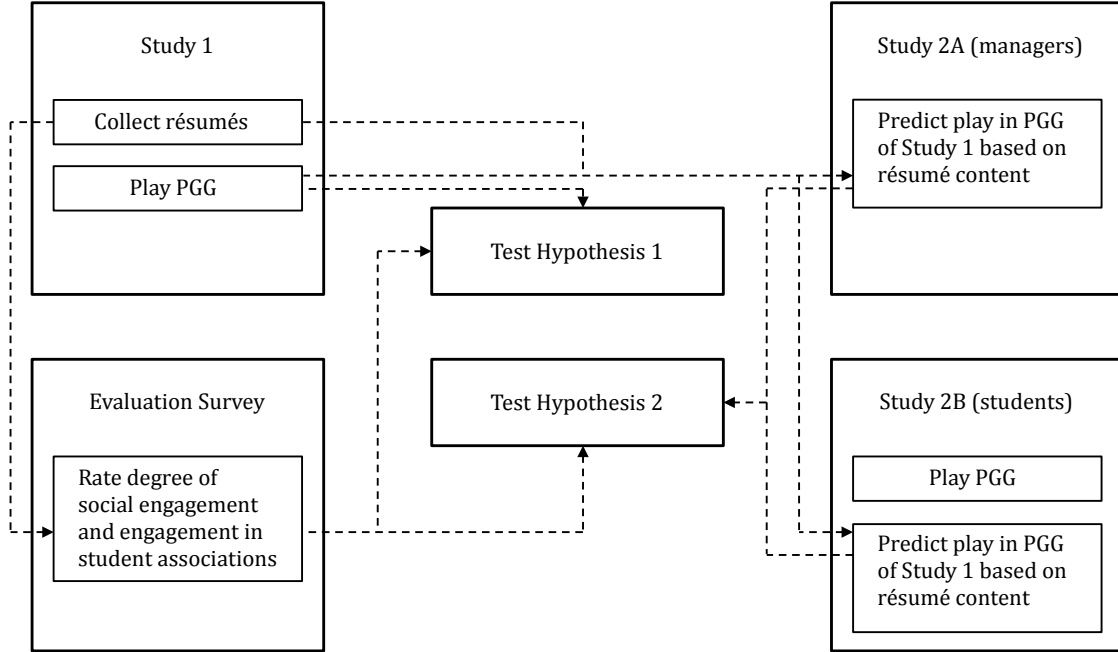


Figure 1: Study Design

In Study 1, we collect subjects’ résumés and let them play the PGG. In the Evaluation Survey, we ask other subjects to rate the intensity of extracurricular activities (social engagement and engagement in student associations) based on the information provided on the résumés from Study 1. We test Hypothesis 1 using the datasets from Study 1 and the Evaluation Survey. In Study 2A and 2B, participants have to predict a Study 1 subject’s contribution in the PGG based on her résumé. Their payoff increases in the precision of their predictions. By randomly varying the informational content of the résumés, we can identify the signaling value of Study 1 subjects’ extracurricular activities with respect to the willingness to cooperate. In Study 2A, participants are managers in human resource departments from various industries; in Study 2B, participants are students with varying academic specializations. We test Hypothesis 2 using the datasets from Study 2A/B and the Evaluation Survey. In the following, we describe the details of each component.

**Experimental procedures of Study 1.** In the invitation email for the experiment, we asked students from all faculties of the *University of Cologne* to bring a current version of their résumé to the lab. Résumés in Germany typically include information about education, professional experience and extracurricular activities. Only subjects who complied were allowed to participate in the experiment. The experimenter collected the résumés and deleted any personal information (name, address, etc.) in front of each subject before the start of the experiment. To ensure the participation of a sufficient number of subjects, we paid a show-up fee of 23 Euros.<sup>8</sup>

The basic experimental game is a standard linear public goods game. Subjects were randomly matched into groups of three participants. In each session, 30 subjects and thus 10 groups participated. Each subject initially held 20 tokens, which she could either keep or contribute to the public good of her group. The payoff of group member  $i$  is given by equation (2). We follow Fischbacher and Gächter (2010) and conduct two types of PGG experiments. In the first type, the “P-experiment,” we elicit subjects’ cooperation preferences in the one-shot PGG. In the second type, the “C-experiment,” subjects play the PGG in ten consecutive rounds with the same matching partners.

The procedure of the P-experiment is essentially the same as in Fischbacher et. al (2001). Subjects make an “unconditional contribution” and a “conditional contribution.” The unconditional contribution is a single decision on how many of the 20 tokens the subject wants to contribute to the public good. This is our main variable of interest.<sup>9</sup> Moreover, we ask subjects about their beliefs regarding the others’ contributions.<sup>10</sup> After this, subjects indicate their conditional contribution for each of the 21 possible average contribution levels (rounded to integers) of the other group members. When all decisions are made, two subjects are randomly chosen in each group, for whom the unconditional contribution becomes relevant, while the conditional contribution (given the other subjects’ contributions) becomes relevant for the remaining subject. This procedure ensures that each decision is made in an incentive-compatible way. Subjects get no feedback about others’ behavior before they play the C-experiment.

In the C-experiment, groups are reshuffled. Subjects then play the PGG in ten rounds with the same group members. After each round, they observe the contributions of their opponents in the previous round and can condition their future actions upon this information (we will use these data for two robustness checks in Section 6).

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<sup>8</sup>Beresford et al. (2012) and Benndorf and Normann (2014) find that individuals are willing to sell substantial personal information for such amounts of money.

<sup>9</sup>Unlike the conditional contribution, the unconditional contribution is simple to explain and easy to use for the prediction experiment in Study 2A/B.

<sup>10</sup>We provide incentives for correct predictions as in Fischbacher and Gächter (2010). These incentives were small to avoid hedging. For a correct prediction, they received three tokens; two tokens (one token) if their prediction deviated by one point (two points) from the opponent’s actual average contribution; and nothing otherwise.

After the PGG, subjects answered an extensive survey in which we asked, among other things, questions on extracurricular activities and professional preferences. Moreover, we measured cognitive ability using a short version of Raven’s Advanced Progressive Matrices (Bors and Stokes 1998). The experiment was programmed using z-Tree (Fischbacher 2007). We used ORSEE (Greiner 2015) to recruit subjects. In total, 354 subjects participated in the experiment.<sup>11</sup> In the survey, 84 percent of our subjects indicate that they used the résumé they handed in for previous applications (for jobs or internships). Payments were made immediately after the end of the session. One token was converted into 0.35 Euros. Each session lasted about 90 minutes. On average, subjects earned 34.10 Euros (including the show-up fee).

**Procedures of the Evaluation Survey.** The goal of the Evaluation Survey is to produce a proxy variable for a subject’s degree of social engagement. Subjects from Study 1 are engaged in a large variety of extracurricular activities. Engagements differ in the type of activity, the targeted group, the level of responsibility, the organizational frame, and the frequency and duration of engagement. Any measure that we construct out of these variables would be highly subjective. We therefore chose to aggregate a number of opinions about one’s degree of social engagement. Specifically, we copied for each résumé all entries about social engagements in anonymized form. Then we recruited students and asked them to rate the intensity of social engagement for each résumé that present some social engagement on a scale between 1 (hardly engaged) to 10 (very intensive social engagement) based on this information. No further résumé content was provided. Each subject rated the social engagement of 12 résumés. We paid a fixed show-up fee of 10 Euros to accomplish this task. Hence, there is no incentive to bias ratings. We obtained 11 to 12 ratings for each résumé with social engagement. The average rating constitutes our measure for the degree of social engagement. In the following, we call this the “social intensity score.” We apply the same method to get a measure for the degree of engagement in student associations, which we call “association intensity score.”

**Experimental procedures of Study 2A.** We collaborated with one of the main associations of German human resource managers, the “Deutsche Gesellschaft für Personalführung e.V.” It allowed us to invite their members to participate in an online experiment. In the instructions for the experiment, we explained the incentive structure of the PGG in detail, and that the interaction between Study 1 subjects was one-shot and anonymous. Participants then made predictions about the unconditional contribution in the PGG for 25 randomly selected Study 1 subjects based on their anonymized résumés

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<sup>11</sup>The focus of this study is on young professionals. Thus, we dropped seven subjects from the Study 1 sample (and six subjects from the Study 2B sample) who were older than 40 years.

(an integer value between 0 and 20). Only résumés of subjects who have been socially engaged or engaged in student or sports associations were considered in Study 2A.<sup>12</sup> To make sure that participants have an incentive to reveal their beliefs truthfully, we use the belief elicitation method from Gächter and Renner (2010). A participant earns 40 Euros for a correct guess. If she misses the true action, her payoff is 20 Euros divided by the absolute distance between her prediction and the true value. A participant’s total earnings from the experiment is the payoff from a randomly chosen prediction plus a fixed fee of 40 Euros.

To identify the effect of social engagement on beliefs, we run two versions of the prediction experiment. In treatment “ECA-ns,” participants see the following résumé content: age, gender, field of study, and professional experience. In treatment “ECA-s,” they receive *exactly* the same résumés but were additionally informed about subjects’ extracurricular activities (see the Online Appendix for an example). For each résumé, we therefore can compare the average prediction when extracurricular activities are not shown to the average prediction when extracurricular activities are shown.

The experiment was administered by CentERdata, Tilburg University. In total, 106 managers participated in Study 2A, 49 in treatment ECA-ns and 57 in treatment ECA-s; they work in 28 different two-digit industries (NACE codes);<sup>13</sup> 72 percent of the managers are female; 76 percent work in organizations that employ more than 500 workers. The managers in our sample have on average 4.6 years (sd = 4.2) of professional experience in HR departments and have interviewed on average 228 applicants (sd = 565) in their life. The managers’ mean earnings were 48.82 Euros (including the fixed fee).

**Experimental procedures of Study 2B.** The main goals of Study 2B is to test whether the findings from Study 2A can be generalized to non-expert subjects, and to rule out potential demand or priming effects through the collection of résumés in Study 1. We recruited student subjects from the *University of Düsseldorf*. They first played the PGG from the P-experiment of Study 1. Subsequently, each participant predicted the unconditional contribution of 12 randomly chosen Study 1 subjects based on their résumés. The résumés were the same as in Study 2A. For a correct guess a participant

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<sup>12</sup>Résumés of subjects who have been engaged in two or three domains (for example, in sports and student associations) were evaluated two or three times, each time by a different manager.

<sup>13</sup>All characteristics of the managers are self-reported. The distribution over industries is as follows: 15.7 percent of them work in the financial industry, 7.8 percent in the machinery industry, 6.7 percent in HR consultancies, 5.6 percent in information services, 5.6 percent in the insurance industry, 5.6 percent in education, 5.6 percent in the pharmaceutical industry, 4.5 percent in the electronic industry, 4.5 percent in computer programming and 4.5 percent in public administration. We do not know gender for seven managers, the size of the firm for two managers, the years of professional experience for nine managers, the number of interviews for eight managers. For seventeen managers, we do not know in which two-digit industry they are working.



earns 20 tokens. If she misses the true action, her payoff is 10 tokens divided by the absolute distance between prediction and true value. A participant’s total payoff in the prediction experiment is the average of payoffs from the 12 predictions. The treatment variation (ECA-ns and ECA-s) is the same as in Study 2A.

At the end of each experimental session, participants completed a survey similar to that in Study 1. Additionally, we asked participants about their extracurricular activities they present on their résumé. Hence, we can check whether the Study 1 results can be replicated using self-reported résumé content (we discuss this robustness check in Subsection 6.1). We then decided through a roll of a dice whether the P-experiment or the prediction experiment determines the payoff. In total, 174 subjects participated in Study 2B, 83 in treatment ECA-ns and 91 in ECA-s. Payments were made after the end of the session. Each session lasted about 75 minutes. On average, subjects earned 22.50 Euros (including a show-up fee of 4 Euros).

## 5 Results

### 5.1 Social engagement and cooperation

From our 347 subjects in Study 1, 20.2 percent present social engagement on their résumé, 21.0 percent engagement in student associations,<sup>14</sup> 8.9 percent engagement in sport clubs, 4.0 percent engagement in political associations, and 3.1 percent engagement in other domains. In the following, we focus on the first two types of engagement and control for the others in our regressions. Figure 2 shows the distribution of the social and association intensity scores from the Evaluation Survey. The average social intensity score is 5.3 (sd = 1.7), while the average association intensity score is 5.6 (sd = 1.5). In both domains, there is substantial heterogeneity in the intensity of engagement (e.g., the lowest social intensity score is 1.8, the highest 9.1).

What does résumé content – and social engagement in particular – reveal about subjects’ willingness to cooperate? The average unconditional contribution in the P-experiment is 9.3 tokens (sd = 6.7), which is similar to that in other studies on one-shot public goods games.<sup>15</sup> If we compare contributions of subjects with and without social engagement on their résumé, we only find a small, statistically insignificant difference (mean contribution = 9.9 (sd = 6.7) for socially engaged subjects versus 9.1 tokens (sd = 6.7) for non-engaged

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<sup>14</sup>By strictly following the definition in footnote 1, we could classify all engagements that subjects wrote on their résumé. Only one engagement belongs to two categories: Two subjects were engaged in a “student association for children.” The goal of this association is to help disadvantaged children in schools, e.g., by helping them with their homework. We classified this activity as social engagement. Classifying it as engagement in student associations would not change our results.

<sup>15</sup>Most studies on PGGs find average contributions between 40 and 60 percent of the endowment, see Chaudhuri (2011) for an overview.

subjects, p-value MW test = 0.468).<sup>16</sup>

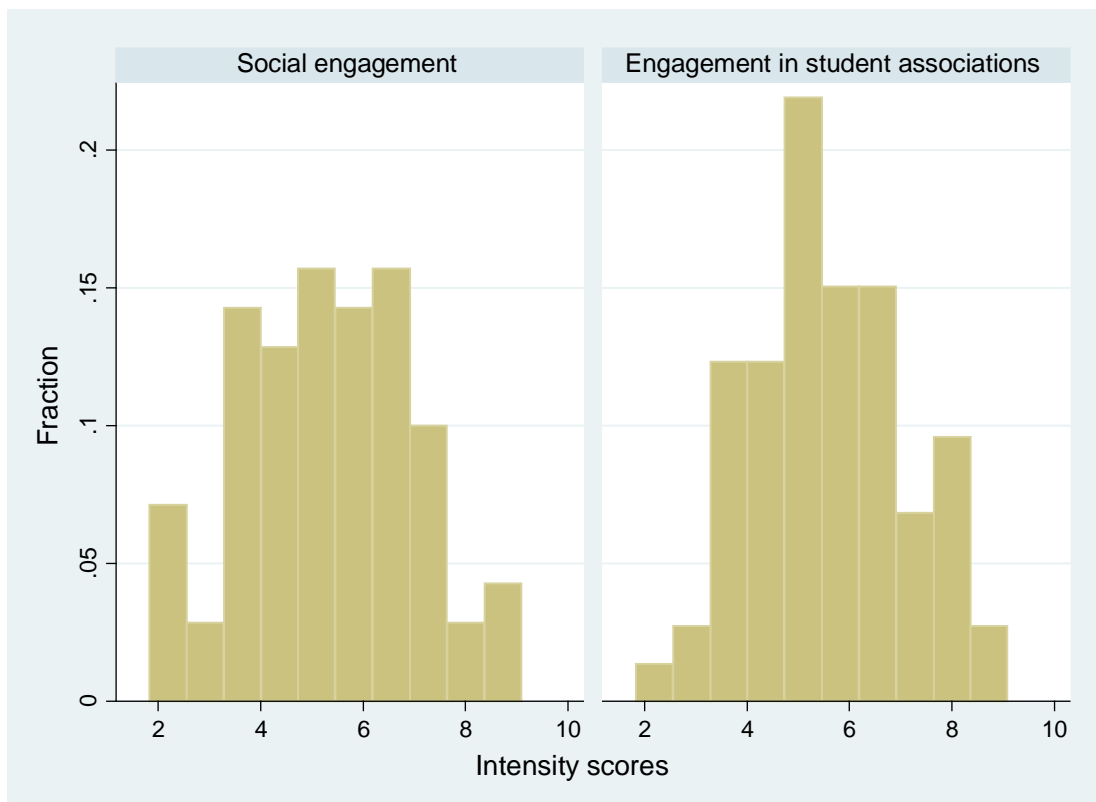


Figure 2: Distribution over social and association intensity scores

A different picture emerges if we group subjects by their social intensity scores. Panel A and B of Table 1 show the average contribution for each quartile of the social and association intensity score distribution, respectively. Contributions increase significantly between the quartiles of the social intensity score distribution (p-value Jonckheere-Terpstra test = 0.055), from 7.6 tokens in the first quartile to 12.1 tokens in the fourth quartile.<sup>17</sup> In contrast, we do not find notable differences across the association intensity score quartiles (p-value Jonckheere-Terpstra test = 0.897).

**[Insert Table 1 and Table 2 about here]**

Panel A of Table 2 presents the results from a number of OLS regressions. In the first specification, we regress a dummy variable, which is set to one if a subject indicated social engagement on the résumé, on unconditional contributions. The coefficient is positive but statistically not significant. In the second specification, we omit this dummy variable and include four dummies, one for each quartile of the social intensity score

<sup>16</sup>We report two-sided p-values for all statistical tests that we present in the paper.

<sup>17</sup>If we classify the subjects in the same way as Fischbacher et al. (2001), we find that 63.4 percent of the subjects without social engagement are “conditional cooperators,” compared to 82.4 percent of the subjects in the third and fourth quartiles of the social intensity score distribution.

distribution. Each dummy is set to one if a subject's score is in the respective quartile of the intensity score distribution and zero otherwise. Moreover, we include a dummy that captures whether the social engagement took place outside of Germany. In the third specification, we include quartile dummies for engagement in student associations and control for engagement in sports, politics and other domains. In the fourth specification, we additionally control for the field of study. In the fifth specification, we add controls for gender, age, foreign origin and cognitive ability.

In all specifications, we find that subjects in the first and second quartile do not behave differently from subjects without social engagement (subjects in the second quartile have slightly higher contributions, but the effect is not statistically significant); subjects in the third quartile contribute around 30 percent more in the PGG; and subjects in the fourth quartile contribute around 40 percent more. In contrast, engagement in student associations is not correlated with contributions. The main qualitative results are the same in a number of robustness checks.<sup>18</sup>

Almost all control variables in our regressions turn out to be statistically insignificant. One of the few exceptions is the field of study "business and economics." The variable is borderline statistically significant, suggesting that business and economics students contribute around 10 percent less. This is in line with a number of previous studies.<sup>19</sup> Moreover, the coefficient for social engagement in foreign countries is negative and statistically significant, indicating that our main effect is driven by subjects who are socially engaged in their local community. Subjects who are socially engaged in foreign countries contribute the same amount or even less than non-engaged subjects. Most of them spent several months in developing countries, and were engaged for some time in social projects.

Is the positive correlation between social engagement and contributions caused by the fact that socially engaged subjects are more optimistic about their opponents' contributions? Overall, contributions are highly correlated with beliefs (the correlation coefficient is 0.82). When we use beliefs as dependent variable in our regressions, we find that subjects in the third and fourth quartile of the social intensity score distribution expect

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<sup>18</sup>In the Online Appendix, we examine a number of robustness checks. First, we control for subjects' professional experience. Next, we control for personal characteristics that may be correlated with social engagement (as discussed in Putnam 2000), namely the working hours per week, subjects' health, the number of children, religiosity, income, wealth, blood donations and donations to charities. Moreover, we run our baseline regression, excluding subjects who have (according to our survey) never used the résumé they brought to the experiment in an application. We also run our baseline regressions with three intensity score thirds instead of four intensity score quartiles, and we estimate a tobit instead of an OLS model. Finally, we run our baseline regression using the social intensity score instead of the quartile dummies. Our main results turn out to be robust.

<sup>19</sup>Several studies show that economics students behave more selfishly than students from other study fields (Marwell and Ames 1981, Carter and Irons 1991, Frank and Schulze 2000, Frey and Meier 2003, Rubinstein 2006, Baumann and Rose 2011).

slightly higher contributions than all others; the differences are, however, not significant.<sup>20</sup> Thus, the positive correlation between social engagement and contributions can, if anything, only partly be explained by subjects' beliefs about their opponents' contributions. An interesting consequence of this finding is that subjects in the third and fourth quartile of the social intensity score distribution on average expect to contribute significantly more than their opponents. All other subjects on average expect to contribute the same amount as their opponents. We conclude:

**Result 1.** *Subjects' contributions in the PGG increase in their degree of social engagement as indicated on their résumé and rated by an independent third party. This confirms Hypothesis 1. The effect is driven by subjects who were socially engaged in their local community. Engagement in other domains (such as student associations) is not positively correlated with contributions.*

## 5.2 Social engagement and employer beliefs

We conjectured that a subject's social engagement changes the beliefs of potential employers regarding her willingness to cooperate. To test this hypothesis, we examine the results from the prediction game that we played with human resource managers (Study 2A) and other student subjects (Study 2B). Since both studies yield similar results, we examine them jointly.

[Insert Table 3 and Table 4 about here]

Table 3 and 4 show the average predictions for résumés with social engagement and engagement in student associations for the two treatments in the two studies.<sup>21</sup> When no information about extracurricular activities is provided (ECA-ns), managers on average predict a contribution of 11.6 tokens (sd = 5.4) and therefore overestimate the Study 1 subjects' willingness to cooperate. Their predictions slightly increase in the intensity of social engagement. As we show in the Online Appendix, this effect is mainly driven by Study 1 subjects' gender. The students' average prediction in ECA-ns is 9.4 tokens (sd = 4.4). On average, they make the same predictions for subjects with social engagement and subjects engaged in student associations.

When managers have information about subjects' extracurricular activities (ECA-s), their mean prediction for socially engaged subjects increases by 12 percent; students'

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<sup>20</sup>See the Online Appendix for a detailed analysis.

<sup>21</sup>We find that most participants used résumé content to make predictions. No manager guessed the same amount for all résumés, and of the 174 students, nine chose this strategy (almost all of them chose 20 tokens). We exclude these subjects from the subsequent analysis. All results are qualitatively the same when we keep them in the sample (see the Online Appendix).

mean prediction for these subjects increases by 20 percent. The predictions for subjects engaged in student associations do not change at all (the managers' prediction even slightly decreases). Both managers' and students' predictions increase in the social intensity score. The increase in the managers' predictions is small and insignificant for the first two quartiles; it is plus 10 percent for the third quartile (borderline significant), and plus 26 percent for the highest quartile. Students' predictions increase by around 15 percent for subjects in the first three quartiles and by 33 percent for subjects in the highest quartile.

**[Insert Table 5 about here]**

These results are confirmed in an OLS regression framework in which we control for further attributes of the résumé (see Table 5). In each regression, one observation is one prediction about the contribution of a Study 1 subject in the ECA-s treatment. The main independent variables in all regressions are dummies for the four quartiles of the intensity score distribution, gender and age, as well as a dummy that captures whether the engagement took place in Germany. Moreover, we include a participant fixed effect. It captures how optimistic a participant is with respect to Study 1 subjects' contributions. In the second specification, we add four dummies for the student association intensity score quartiles and controls for the field of study as well as the industry in which the Study 1 subject had professional experience. In the third specification, we drop these controls and include the average prediction for a subject from the ECA-ns treatment instead. Hence, we estimate the predicted contribution of a participant if she is informed about the extracurricular activities of a subject, controlling for the mean prediction when extracurricular activities are not shown (i.e., from other participants). This specification is our preferred estimation since it accounts for the fact that predictions may be driven by combinations of characteristics (e.g., high mean predictions for women who study sociology). In the first three specifications, predictions of subjects engaged in sports clubs are used as the baseline. In the fourth specification, we use a different baseline. We exclude the first quartile of the association intensity score distribution but include a dummy capturing whether a subject was engaged in a sports association.

In all specifications, we find an economically and statistically significant effect for each quartile of the social intensity score distribution. The effects are robust across specifications, although the magnitude of the effects slightly differs between managers and students. The managers' prediction when the subject exhibits social engagement in the first (second, third, fourth) quartile increases by around 20 (25, 30, 50) percent. The corresponding numbers for students are 8 (12, 17, 24) percent. Hence, both groups predict that contributions increase in the intensity of social engagement. However, managers slightly over- and students slightly underestimate the informational value of intensive

social engagement. Both groups overestimate the informational content of social engagement in the first two intensity score quartiles.

Engagement in student or sports associations has no effect on predictions. Hence, the differences in predictions for socially engaged subjects are driven by the informational value of social engagement, not by the fact that participants receive more information about Study 1 subjects.

Few other characteristics of the résumé influence beliefs. Managers and students alike estimate that females and older subjects contribute more in the PGG. Students (but not managers) correctly anticipate that business and economics students contribute less to the PGG. None of these effects are large. Intensive social engagement is the feature on the résumé that has by far the biggest impact on predictions. We summarize our results:

**Result 2.** *Managers' and students' predictions about contributions in the PGG increase in the Study 1 subjects' degree of social engagement as indicated on their résumé and rated by an independent third party. This confirms Hypothesis 2. Engagement in other domains (such as student associations) is not correlated with predictions. Both managers and students overestimate the informational value of low-degree social engagement.*

## 6 Further Results

### 6.1 Priming

One may be concerned that the collection of résumés in Study 1 has a demand or priming effect: It reminds subjects about their extracurricular activities and thus pushes those with intensive social engagement to contribute more in the PGG. We can rule out such concerns with our data from Study 2B. As in Study 1, subjects played the PGG of the P-experiment, but they did not hand in their résumés before the experiment. At the end of the experimental session, we asked subjects to answer the following question (in German): “Consider your personal résumé that you use for applications. Does it state that you have been or are currently involved in volunteering? If yes, what exactly did you write about this on your résumé (that is, what period of time, which organization, what role)?” From the 168 subjects in Study 2B, 25.0 percent indicated social engagement, 8.3 percent engagement in student associations, 8.3 percent engagement in sports associations, and 4.8 percent engagement in other domains. For all entries about social engagement and engagement in student associations we elicited the intensity score by conducting another Evaluation Survey. Hence, we can perform the same analysis as for Study 1 subjects. The results are roughly the same as in Study 1. The average unconditional contribution is 10.0 tokens (sd = 6.7). The 21 subjects with above-median social intensity scores

contribute significantly more than subjects without any social engagement (mean contribution = 12.5 tokens (sd = 5.9) versus 9.8 tokens (sd = 6.8), p-value MW test = 0.086). The 21 subjects with below-median social intensity scores do not behave significantly different from those without social engagement (mean contribution = 8.9 tokens (sd = 6.4), p-value MW test = 0.585). Again, we find no such effect for any other extracurricular activity. As a robustness check, we merge these data with the data from Study 1 and rerun our main regressions, including a dummy that captures whether the information about extracurricular activities are self-reported (see Panel B of Table 2). Note that we now have more than 500 observations in the regressions, including 112 subjects who present social engagement on their résumé. Our main results from Study 1 turn out to be robust. We conclude that the results in Study 1 are not driven by demand or priming effects.

## 6.2 Social work and preferences

Does working in social occupations *per se* change one’s social preferences, or is the important feature of social engagement the fact that it is done voluntarily? It is impossible to answer this question conclusively since one cannot randomly assign jobs to subjects that are sufficiently demanding to be rated as intensive social engagement (at least not in developed countries). However, our data are rich enough to provide some indicative evidence. In Study 1, 34 subjects have professional experience in “social work” or “residential care” (NACE codes 87 and 88, respectively), i.e., they were properly employed in these sectors and received a salary. A majority of these subjects worked in similar organizations as the (voluntarily) socially engaged subjects. Thus, we can compare the behavior of socially engaged subjects with that of subjects who exhibit considerable professional experiences in social work.<sup>22</sup> If the positive effect of intensive social engagement on contributions is a pure “treatment” effect, the contributions of these subjects and the predictions about their behavior should be close to that of subjects with intensive social engagement.

We run our baseline regression from Study 1 and include a dummy that captures professional experience in social work. In a second step, we interact the dummy with the number of months that a subjects has worked in the sector, which we use as a proxy for the degree of professional experience in social work. In a third (fourth) step, we exclude all subjects who have between 0.5 and 6 (0.5 and 12) months experience in the sector. Indeed, we find that subjects with experience in this sector contribute around 10 percent more in the PGG than others. However, this effect is not statistically significant

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<sup>22</sup>In total, 58.8 percent of the 34 subjects worked in organizations that are active for children and juveniles and 35.3 percent in organizations that help individuals with disabilities.

(p-value = 0.417). The interaction term for the degree of experience is almost zero and insignificant, and the main qualitative results are the same if we drop subjects who have only a few months of professional experience in the social work sector (see the Online Appendix for more details).

Half of the subjects with professional experience in the social work sector also volunteer in social organizations, student associations or sports. For this sub-sample, we have 144 predictions from the managers in treatment ECA-s of Study 2A and 115 predictions from students in treatment ECA-s of Study 2B. When we run our baseline regression from Study 2A and 2B and include a social work experience dummy, we find that both managers' and students' predictions increase by around 7 percent. Again, the effect is not statistically significant (p-values > 0.161).<sup>23</sup>

Overall, we find only weak evidence for the hypothesis that social work changes one's preferences. Note that our empirical strategy overestimates the effect since it does not take into account the self-selection of subjects into (paid) social work. If anything, the experience effect is small relative to the signaling value of voluntary social engagement.

### 6.3 Social engagement and strategic cooperation

If the interaction between team members is repeated, strategic concerns typically increase contributions. In particular, subjects who free-ride in the one-shot PGG may cooperate in the first periods of the repeated PGG to mask their true preferences. One may hypothesize that the difference in contributions between subjects with intensive social engagement and all other subjects will decrease or vanish in the beginning of the repeated PGG. To test this conjecture, we examine subjects' contributions in the first period of the C-experiment (the ten-periods PGG with stable matchings).<sup>24</sup>

Interestingly, we observe similar results as in the P-experiment. When we run our baseline regressions from Study 1 using the first period contributions as dependent variable, we find the following pattern: Subjects with social engagement in the first two quartiles of the social intensity score distribution do not act significantly different from non-engaged subjects; subjects in the third quartile contribute around 20-30 percent more (the effect is significant only in one specification); and subjects in the fourth quartile contribute around 40-50 percent more. Again, beliefs cannot explain these findings. When we run the regressions using beliefs about the opponents' first-period contributions as the dependent variable, we find no statistically significant differences between subjects with

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<sup>23</sup>When we use the data from ECA-ns and run our baseline regression (specifications 2a and 2b without extracurricular activities), the impact of social work experience on predictions has a similar magnitude as in the regressions discussed above (around 7 percent), and the effect is not statistically significant.

<sup>24</sup>See the Online Appendix for a detailed analysis.



intensive social engagement and without social engagement. We conclude that résumé content is also informative about the willingness to cooperate in strategic situations.

## 6.4 Building cooperative teams based on résumé content

Several papers show that groups consisting of subjects who are not free-riders cooperate more successfully in the repeated PGG than randomly matched groups, e.g., Burlando and Guala (2005), Gächter and Thöni (2005), Gunnthorsdottir et al. (2007), De Oliveira et al. (2015). These papers build cooperative groups by matching subjects based on their behavior in experimental games. For example, Gächter and Thöni (2005) build groups for the repeated PGG based on contributions in the one-shot PGG. They match those subjects who contributed most in a one-shot PGG.<sup>25</sup> These groups significantly outperform randomly matched groups.<sup>26</sup>

Our first main result implies that one can actually use résumé content to achieve the same effect. We test this conjecture using the data from the C-experiment from Study 1. After we collected the résumés and before the start of the C-experiment, we manipulated the composition of groups for this part of the experiment. In each session, we matched one or two groups consisting of subjects who exhibit intensive social engagement according to our subjective impression of their extracurricular activities (note that at the time the matching took place we did not have the data from the Evaluation Survey yet). This process was unknown to subjects.

The matching procedure created groups in which several subjects exhibit intensive social engagement. We have ten groups with two or three subjects who exhibit social engagement in the third and fourth quartile of the intensity score distribution (all of them were created through our routine). In all other 107 groups (5 of them were matched through our routine), there is at most one such subject. We call the former groups “high-type groups,” and the later “normal groups.”

Figure 3 displays the evolution of cooperation in high-type and normal groups. The average contribution in the ten periods of the C-experiment is 11.1 tokens ( $sd = 7.8$ ). We find the usual pattern of contributions in PGGs. There is substantial cooperation in the initial periods, decay over time and a significant end-game effect. High-type groups outperform the normal groups by around 40 percent. Their average contribution in the ten periods is 15.1 tokens ( $sd = 6.1$ ), while the average contribution in all other groups is only 10.7 tokens ( $sd = 7.8$ ). Hence, by evaluating subjects’ degree of social engagement,

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<sup>25</sup>Relatedly, Englmaier et al. (2013) measure subjects’ reciprocity in a trust-game and provide this information to principals in a subsequent gift-exchange game. The principals then offer higher wages to more reciprocal agents.

<sup>26</sup>This result holds regardless of whether subjects are informed about the matching or not, see De Oliveira et al. (2015).

one can build cooperative groups based on résumé content.<sup>27</sup>

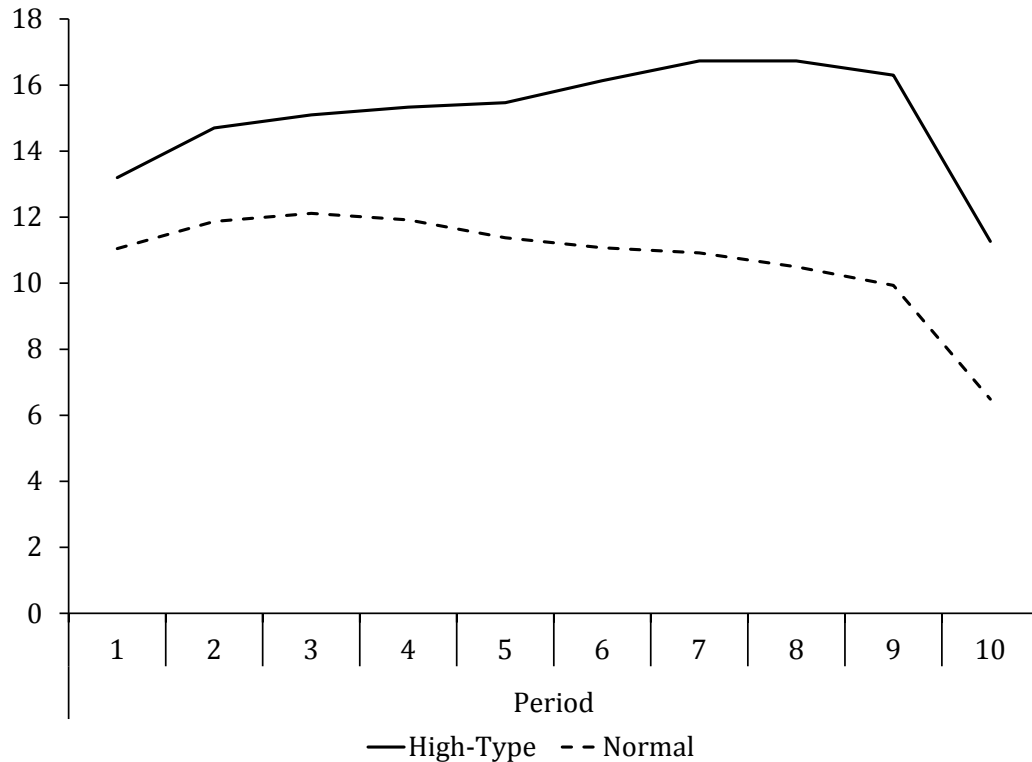


Figure 3: Average contributions in the C-Experiment by high-type and normal groups

## 6.5 What is intensive social engagement?

Throughout the analysis, we used the social intensity score as a measure for the degree of social engagement. We therefore were silent about which activities are evaluated as intensive social engagement and thus have signaling value with respect to voluntary cooperation. In this subsection, we briefly examine the extracurricular activities of those subjects who indicated social engagement on their résumé.

[Insert Table 6 about here]

Table 6 provides an overview of the organizations in which subjects were active, the clients that benefited from the engagement, and whether subjects were in a leadership position.<sup>28</sup> Two interesting patterns emerge<sup>29</sup> in the descriptives if we compare the

<sup>27</sup>In seminars, we were frequently asked how subjects with intensive social engagement react if others in their group do not cooperate. One may conjecture that they react more negatively to low contributions than subjects without social engagement. In the Online Appendix, we show that this was not the case in our experiment.

<sup>28</sup>E.g., youth leader in the local church, main organizer of youth camps.

<sup>29</sup>See the Online Appendix for the corresponding regression analysis.

engagements across the social intensity score quartiles. Subjects who are rated as highly socially engaged are more likely active in helping individuals with disabilities, and they are more likely to be in a leadership position of the organization that manages the engagement.<sup>30</sup> The two patterns are confirmed in Study 2B, where we asked subjects about their social engagement at the end of the experimental session. In the subsample of those subjects who received above-median social intensity scores, 19.0 percent are engaged in helping disabled individuals and 38.1 percent had leadership positions; in the subsample of subjects with below-median social intensity scores, none are engaged in helping disabled individuals and only 4.8 percent were in a leadership position.

Both patterns indicate that intensive social engagement is demanding for the engaged individual in terms of time and effort. This observation is important. It shows that it would be costly to have intensive social engagement on the résumé if one does not care about the object of engagement. Presenting intensive social engagement on the résumé without being engaged is costly because it requires outright lying, which is risky in the context of employment relationships.

One may conjecture that there is a trade-off between social engagement and cognitive ability. This trade-off does not exist in our data. Subjects in Study 1 and Study 2B without social engagement on average correctly answer 7.0 questions ( $sd = 2.2$ ) in the Raven's test, while subjects with social engagement in the third and fourth quartile of the social intensity score distribution correctly answer 7.1 questions ( $sd = 2.4$ ). The difference is not significant ( $p$ -value MW test = 0.639). Also in the regressions of Table 2, cognitive ability has no significant impact on contributions in the PGG. The willingness to cooperate is therefore unrelated to cognitive ability.

## 7 Conclusion

In this paper, we examined what employers learn from an applicant's vita about her willingness to cooperate in teams. We found that subjects with intensive social engagement on their résumé both contribute significantly more in a PGG and are expected to contribute more than others by human resource managers (and other students). No other attribute or activity on the résumé has such an effect. Hence, only activities which convincingly show that someone really cares about other people credibly signals the will-

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<sup>30</sup>One may conjecture that also subjects in leadership positions of student associations behave more cooperatively. Alternatively, one may posit that our main result is exclusively driven by socially-engaged subjects who are in leadership positions or who are active in helping disabled individuals. In the Online Appendix, we show that both conjectures do not hold. In particular, subjects who are in the third and fourth quartile of the social intensity score distribution but who do not exhibit the two characteristics (leadership position, disabled individuals) on average behave like subjects in the same quartile who exhibit these characteristics.

ingness to cooperate in teams. We conclude that actual job market signaling is not only about a worker's productivity, but also about important behavioral characteristics.

One essential question that we do not answer in this paper is how much human resource managers care about this signal. Does someone with intensive social engagement on her résumé have a competitive edge above someone who does not? And if yes, how important is the signal about the applicant's social preferences as compared to other characteristics, such as leadership skills or experience in dealing with other people?

We posit that the answer to the first question is "yes." Extracurricular activities are an important part of an student's vita (e.g., Rubin et al. 2002) and are usually presented on the résumé. Several psychological studies show that recruiters' initial perceptions of an applicant's skills and personality indeed depend on her extracurricular activities (e.g., Nemanick and Clark 2002, Cole et al. 2003, 2004, 2007, Tsai et al. 2011). Nemanick and Clark (2002), Chia (2005) and Cole et al. (2007) present evidence that résumés with more extracurricular activities receive more invitations to job interviews and job offers. In our data from Study 1 and Study 2B, the most common type of extracurricular activity was social engagement. Thus, we believe that the presentation of social engagement on the résumé improves an applicant's chances in the job market.

Still, the question remains to what extent social engagement during adolescence and early adulthood is related to labor market success. Our results suggest a method for answering this question using labor market surveys (such as the GSOEP). To get a precise measure for the degree of social engagement, one can collect information about subjects' extracurricular activities through our question from Study 2B ("Consider your personal résumé that you use for applications [...]"), and classify responses with our Evaluation Survey. The focus should be on social engagement that took place prior to the job market entry. These steps produce a measure for the degree of social engagement that can be used to study the link between engagement and labor market outcomes.

The second question is more difficult to answer, and future research may address it. Our preliminary answer is "yes, depending on the industry." In some work environments (such as the financial industry), outputs are a precise signal about individual inputs, meaning that an employee's willingness to cooperate in teams is (generally) not important. Human resource management for such work environments may not have a particularly pronounced demand for employees who care about other people. However, in other work environments, outputs are hard to attribute to a particular effort, and monitoring or the provision of explicit incentives may have unintended negative consequences (as in the public sector or in non-profit organizations). It is then probably a good idea to search for employees who care about others. Indeed, Huang and Cappelli (2010) find some evidence that firms that screen applicants for factors that predict "work ethic" economize on monitoring. Future work in behavioral economics may provide further insights on

how important the employees' social preferences are for the success of an organization.

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## Appendix – Omitted Tables

**TABLE 1 – Descriptive Statistics (Study 1): Mean contribution, by intensity scores**

<b>Panel A: Social intensity score</b>					
	No engagement (n=277)	1st quartile (n=18)	2nd quartile (n=18)	3rd quartile (n=17)	4th quartile (n=17)
Mean contribution	9.1 (6.7)	7.6 (6.1)	9.6 (6.8)	10.4 (7.1)	12.1 (6.5)

<b>Panel B: Association intensity score</b>					
	No engagement (n=274)	1st quartile (n=19)	2nd quartile (n=18)	3rd quartile (n=18)	4th quartile (n=18)
Mean contribution	9.3 (6.7)	9.2 (6.5)	10.0 (5.2)	7.7 (8.1)	9.7 (7.4)

The table displays the mean unconditional contribution of subjects in the P-experiment. Standard deviations are in parenthesis. In column 1, of Panel A we present the descriptive statistics for subjects whose résumé does not display social engagement. In column 2-5, we show the mean unconditional contributions of subjects for each quartile of the social intensity score distribution. In Panel B, we present the corresponding values for subjects who are (not) engaged in student associations.

**TABLE 2 – Baseline Regression (Study 1)**

Specification	Panel A				Panel B		
	(1a)	(2a)	(3a)	(4a)	(5a)	(1b)	(2b)
Constant	9.101*** (0.404)	9.101*** (0.407)	9.488*** (0.455)	10.236*** (0.803)	10.337*** (3.375)	9.141*** (0.390)	6.516** (2.722)
Social engagement	0.707 (0.894)						
Social intensity score Q1		-0.292 (1.543)	-0.583 (1.554)	-0.704 (1.513)	-0.570 (1.512)	-1.318 (1.221)	-1,120 (1.200)
Social intensity score Q2		0.709 (1.652)	0.897 (1.480)	0.597 (1.546)	0.866 (1.536)	1.308 (1.261)	0.881 (1.186)
Social intensity score Q3		2.309 (1.888)	3.349** (1.652)	3.260* (1.813)	3.257* (1.871)	2.394* (1.312)	2.841** (1.242)
Social intensity score Q4		4.226*** (1.536)	4.229** (1.681)	3.843** (1.784)	4.010** (1.876)	3.409*** (1.300)	3.434** (1.385)
Association score Q1			-0.192 (1.536)	0.233 (1.509)	-0.047 (1.529)		0.587 (1.473)
Association score Q2			0.645 (1.258)	1.005 (1.362)	0.854 (1.397)		0.780 (1.259)
Association score Q3			-0.214 (2.003)	0.337 (1.970)	1.287 (1.985)		0.303 (1.800)
Association score Q4			0.737 (1.568)	1.276 (1.626)	1.133 (1.609)		0.650 (1.394)
Female					-0.405 (0.824)		-0.256 (0.657)
Age					0.051 (0.122)		0.162* (0.091)
$R^2$	0.002	0.024	0.079	0.096	0.101	0.026	0.068
Sample size	347	347	347	345	345	515	513
Foreign country engagement	No	Yes	Yes	Yes	Yes	Yes	Yes
Engagement sports	No	No	Yes	Yes	Yes	No	Yes
Engagement politics	No	No	Yes	Yes	Yes	No	Yes
Engagement others	No	No	Yes	Yes	Yes	No	Yes
Field of study	No	No	No	Yes	Yes	No	Yes
Foreign origin	No	No	No	No	Yes	No	No
Raven's IQ	No	No	No	No	Yes	No	Yes
Study 2B data included	No	No	No	No	No	Yes	Yes

One observation is one subject. The dependent variable is the unconditional contribution in the P-experiment. Panel A: Social engagement is a dummy set to one if a subject was socially engaged according the résumé. Social intensity score Q1 is a dummy set to one for subjects whose social intensity score is in the lowest quartile of the social intensity score distribution. Social intensity score Q2, Social intensity score Q3 and Social intensity score Q4 are dummies that are defined in a similar way for the other quartiles. Association score Q1, Association score Q2, Association score Q3 and Association score Q4 are dummies that are set to one if a subject has an association intensity score in the corresponding quartile of the association intensity score distribution. Female is a dummy set to one if a subject is female. Foreign country engagement is a dummy set to one if a subject's résumé displays at least one social engagement that did not take place in Germany. Engagement sports, Engagement politics and Engagement others are dummies that are set to one if a student has volunteered in a sports association, political institution or in other institutions. Field of study: we include five dummies, one for each field that at least ten subjects in our sample were enrolled in (business/economics, legal studies, sociology, teaching, languages, regional studies). For two subjects we could not identify the field of studies. Raven's IQ is the number of correctly answered questions in the Raven's test. Foreign origin is a dummy set to one if the last school of a subject was outside of Germany. Panel B: Here we match the data from Study 1 and Study 2B. All data from Study 2B are self-reported. We do not know in which industry the subjects have professional experience and whether they are of foreign origin or not. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . Robust standard errors are in parenthesis.

**TABLE 3 – Descriptive Statistics (Study 2A): Predictions, by intensity scores**

<b>Panel A: Social intensity score</b>					
	Overall	1st quartile	2nd quartile	3rd quartile	4th quartile
ECA-ns	11.6 (5.4)	11.0 (5.1)	11.5 (5.9)	11.8 (5.6)	12.1 (5.2)
	(n=488)	(n=121)	(n=131)	(n=114)	(n=122)
ECA-s	13.0 (5.2)	11.8 (5.0)	12.1 (5.3)	13.0 (4.9)	15.2 (5.1)
	(n=558)	(n=134)	(n=153)	(n=133)	(n=138)
P-value MW test	0.000	0.195	0.440	0.103	0.000

<b>Panel B: Association intensity score</b>					
	Overall	1st quartile	2nd quartile	3rd quartile	4th quartile
ECA-ns	10.0 (5.3)	9.3 (5.3)	10.9 (5.5)	10.3 (5.3)	9.5 (5.0)
	(n=524)	(n=143)	(n=121)	(n=143)	(n=117)
ECA-s	8.7 (5.2)	8.1 (4.8)	8.3 (5.1)	8.9 (5.3)	9.3 (5.7)
	(n=597)	(n=164)	(n=147)	(n=158)	(n=128)
P-value MW test	0.000	0.049	0.000	0.023	0.880

The table displays the mean predictions of managers, overall and by quartile of the social (Panel A) and association (Panel B) intensity score distribution. Standard deviations are in parenthesis. ECA-ns/ECA-s are the data from the respective treatments. P-value MW test is the p-value from in a two-sided Mann-Whitney test.

**TABLE 4 – Descriptive Statistics (Study 2B): Predictions, by intensity scores**

<b>Panel A: Social intensity score</b>					
	Overall	1st quartile	2nd quartile	3rd quartile	4th quartile
ECA-ns	9.4 (4.4)	9.4 (4.1)	9.4 (4.3)	9.4 (4.7)	9.5 (4.4)
	(n=367)	(n=95)	(n=93)	(n=89)	(n=90)
ECA-s	11.3 (5.0)	10.8 (4.8)	11.0 (4.9)	11.0 (4.9)	12.6 (5.2)
	(n=367)	(n=95)	(n=93)	(n=89)	(n=90)
P-value MW test	0.000	0.014	0.021	0.008	0.000

<b>Panel B: Association intensity score</b>					
	Overall	1st quartile	2nd quartile	3rd quartile	4th quartile
ECA-ns	9.5 (5.0)	9.2 (4.9)	9.5 (4.7)	9.4 (5.3)	9.8 (5.0)
	(n=384)	(n=98)	(n=95)	(n=92)	(n=99)
ECA-s	9.6 (5.1)	9.6 (4.6)	9.5 (5.2)	9.6 (5.0)	9.9 (5.6)
	(n=412)	(n=111)	(n=101)	(n=102)	(n=98)
P-value MW test	0.520	0.456	0.967	0.594	0.931

The table displays the mean predictions of students from Study 2B, overall and by quartile of the social (Panel A) and association (Panel B) intensity score distribution. Standard deviations are in parenthesis. ECA-ns/ECA-s are the data from the respective treatments. P-value MW test is the p-value from in a two-sided Mann-Whitney test.

**TABLE 5 – Baseline Regression (Study 2A/B)**

Specification	Panel A: HR Manager (Study 2A)				Panel B: Students (Study 2B)			
	(1a)	(2a)	(3a)	(4a)	(1b)	(2b)	(3b)	(4b)
Constant	1.945 (1.177)	3.793*** (1.228)	0.237 (1.204)	-0.056 (1.235)	6.870*** (1.233)	8.289*** (1.377)	6.503*** (1.447)	6.561*** (1.342)
Social intensity score Q1	1.990*** (0.480)	0.955 (0.617)	2.011*** (0.535)	2.305*** (0.534)	0.824** (0.337)	0.605 (0.412)	0.947** (0.397)	0.888 (0.557)
Social intensity score Q2	2.844*** (0.480)	1.998*** (0.571)	2.317*** (0.557)	2.611*** (0.532)	1.334*** (0.381)	0.902* (0.523)	1.426*** (0.453)	1.368** (0.526)
Social intensity score Q3	3.307*** (0.557)	2.838*** (0.649)	3.048*** (0.624)	3.342*** (0.569)	1.149*** (0.391)	1.089*** (0.535)	1.255*** (0.447)	1.197*** (0.474)
Social intensity score Q4	5.335*** (0.557)	4.420*** (0.654)	5.076*** (0.625)	5.370*** (0.581)	2.352*** (0.439)	2.058*** (0.525)	2.487*** (0.458)	2.428*** (0.561)
Student association score Q1		-0.650 (0.581)	-0.294 (0.503)			-0.006 (0.550)	0.059 (0.527)	
Student association score Q2		-0.558 (0.514)	-0.814* (0.438)	-0.520 (0.493)		0.196 (0.473)	0.205 (0.432)	0.147 (0.559)
Student association score Q3		0.081 (0.519)	0.173 (0.487)	0.467 (0.550)		0.370 (0.500)	0.150 (0.468)	0.091 (0.586)
Student association score Q4		0.152 (0.621)	0.599 (0.642)	0.893 (0.673)		0.369 (0.502)	0.090 (0.476)	0.031 (0.575)
ECA-ns mean prediction			0.403*** (0.057)	0.402*** (0.057)			0.060 (0.099)	0.060 (0.099)
Engagement in sports				0.294 (0.503)				-0.059 (0.527)
Female	2.340*** (0.422)	1.802*** (0.387)	1.410*** (0.419)	1.410*** (0.419)	0.800** (0.379)	0.465 (0.381)	0.759* (0.393)	0.759* (0.393)
Age	0.238*** (0.047)	0.181*** (0.049)	0.163*** (0.048)	0.163*** (0.048)	0.096** (0.047)	0.056 (0.052)	0.084* (0.050)	0.085* (0.059)
$R^2$ (FE-regressions: overall)	0.190	0.226	0.218	0.218	0.044	0.057	0.043	0.043
Sample size	1406	1406	1406	1406	972	972	972	972
Subject fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Foreign country engagement	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Field of study	No	Yes	No	No	No	Yes	No	No
Industries	No	Yes	No	No	No	Yes	No	No

Fixed effects regression. One observation is one prediction of a manager (Panel A) or a student (Panel B) in the ECA-s treatment. Social intensity score Q1, Social intensity score Q2, Social intensity score Q3 and Social intensity score Q4 are four dummies. Each dummy is set to one if the subject's (whose résumé was presented to the manager/student) social intensity score is in the corresponding quartile of the social intensity score distribution. Student association score Q1 to Student association score Q4 are four dummies that are defined in similar manner for engagement in student associations. Engagement in sports is a dummy that is set to one if a subject is engagement in a sports association. ECA-ns mean prediction is the mean prediction of other managers/students in the ECA-ns treatment for the corresponding subject. These are the mean predictions of managers/students who received the same information, except that they were not informed about a subject's extracurricular activities. Female, Age, Field of Study and Industries are the gender, age, field of study (5 fields, one dummy for each field) of the subject whose résumé was shown and the industry in which she has professional experience (11 industries, one dummy for each industry). In each column, we include a subject fixed effect for the manager/the student. Standard errors are clustered on the manager/student level. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . Standard errors are clustered on the manger/the student level.

**TABLE 6 – Characteristics of social engagement (Study 1), by intensity scores**

	1st quartile (n=18)	2nd quartile (n=18)	3rd quartile (n=17)	4th quartile (n=17)
<b>Organization</b>				
Church	27.8%	44.4%	41.2%	70.6%
NGOs, private initiatives	38.9%	16.7%	47.1%	58.9%
Public or private educational institutions	27.7%	22.2%	23.5%	0.0%
Others (hospitals, development aid, etc.)	11.1%	16.7%	5.8%	11.8%
<b>Position</b>				
Leadership position	0.0%	22.2%	35.3%	58.8%
<b>Clients</b>				
Children/juvenile	72.2%	72.2%	82.3%	58.8%
Disabled individuals	0.0%	11.1%	23.5%	41.1%
Poor individuals	22.2%	0.0%	11.8%	23.5%
Others (seniors, migrants, etc.)	27.8%	22.2%	17.6%	17.6%

The table provides an overview of the characteristics of the social engagement of the subjects, by social intensity scores. Organization is the organization in that a subject was socially engaged. Position captures whether a subject was in a leadership position in the respective organization. Clients are the clients who benefited from the social engagement of the subject. The percentage numbers are the shares of the subjects in the respective group to whom the characteristics apply. For example, 27.8 percent of the subject with an intensity score in the first quartile of the distribution are engaged in the church, 38.5 percent in NGOs or private initiatives.

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