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Is social capital bridging or bonding? Evidence from a field experiment with association members

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Abstract

Social capital theorists posit that association members are key agents for propagating norms of trust and trustworthiness from within associations toward the society as a whole. Nevertheless, others claim that social capital is primarily bonding, that is, it helps ingroup members better achieve internal goals, but little benefits or even costs carry over to the rest of society. We deploy experimental methods to probe into whether social capital in associations has a predominantly bridging or bonding nature. We compare members' behavior in anonymous Trust Games with behavior by a demographically comparable sample of non-members. We find that (a) Members are significantly more trusting and trustworthy than the general population both when interacting with fellow members and with people from the general population; (b) Members trust and repay trust from people from the general public nearly at the same level as they do with fellow members. Therefore, most of social capital existing within associations "bridges" over to the rest of society. We quantify 83% of additional trust, and 71% of additional trustworthiness existing in associations vis-à-vis society at large to be bridging and the remainder to be bonding. (c) Association members are no more optimistic or less accurate in predicting others' behavior than people from the general public. (d) Increased involvement in association activities is not correlated with increased pro-sociality.

Keywords Trust · Trustworthiness · Social capital · Voluntary associations · Ingroup bias · Field experiment

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1 Introduction

Since de Tocqueville's account of the US nineteenth century society, a long tradition in the political sciences attributes a fundamental role to voluntary associations in fostering civic attitudes in their members and in ensuring the stability and effectiveness of democratic institutions (de Tocqueville, 1840; Liphart, 1977; Truman, 1971). This tradition has been revived by social capital theory. Social capital is generally referred to as all "features of social life—networks, norms, and trust—that enable participants to act together more effectively to pursue shared objectives" (Putnam, 1995: 67). One of the theory's central tenets is that participation in voluntary associations facilitates the development of habits of solidarity, trust, and trustworthiness in their members through direct and indirect reciprocity (Nowak, 2006; Putnam, 2000). Crucially, social capital theory posits that members' pro-social behavior[1] does not remain confined within the association but expands to the whole society, because association members treat "insiders" and "outsiders" equally (Putnam, 2000). If this were the case, social capital would be "bridging"—namely, association members would extend the norms of cooperation and trust learned within the association to the society at large.

A less optimistic view is that social capital has a predominantly "bonding" character, such that cooperative norms developed within associations remain confined therein without spilling over to the rest of society. Bowles and Gintis (2002) argue that such civic norms are beneficial for groups to achieve coordination on socially beneficial outcomes, as is the case for a large number of groups ranging from fisher cooperatives in Japan to neighborhoods actively reducing crime rates in the US. Nevertheless, the very success of such norms relies on a rather stark division between "insiders" and "outsiders", which, in the best case, would limit the benefits of social capital to insiders only (Orr, 1999), or, in the worst case, would be outright detrimental to the rest of society (Sobel, 2002). A textbook example of the latter are mafia organizations, which thrive on a tight-knit network of mutual obligations for its members that is undeniably a form of social capital (Gambetta, 2000). Moreover, excessive trust on one's ingroups, particularly across ethnic and racial cleavages, may lead to negative outcomes for the society at large, both in terms of discrimination and unequal access to resources (Portes, 2014), but even in terms of lower financial outcomes (Levine et al., 2014). Such concerns on the bonding character of social capital have been confirmed in experimental economics studies showing that the "pure" economic value of creating groups is negative (Chen & Li, 2009; Hargreaves Heap & Zizzo, 2009).

The goal of this paper is to probe into the claim that association members' prosociality is bridging rather than bonding. We take an individual perspective and construe social capital as the individual willingness to comply with norms of trust and reciprocity, rather than as actual social connections (Sobel, 2002). We involve

[1] By pro-social behavior, we mean altruistic or group-oriented actions that require some sacrifice of resources to the individual. In the specific context of our experiment, we refer to both trust and trustworthiness as pro-social actions.

association members in laboratory-controlled decisions involving trust and trustworthiness toward unknown others, who are either unidentified fellow association members or anonymous people from the general population. We contrast association members' behavior with that of a demographically comparable sample of people who are not members of associations. We can thus contrast patterns of trust and trustworthiness within and outside associations. Furthermore, by eliciting beliefs on others' behavior, we can explore the psychological mechanisms underpinnings motivations. We also provide an indirect test of the claim that more intensive involvement with associational activities induces higher pro-sociality.

Many survey studies found that association membership was indeed correlated with higher generalized trust and civic-minded attitudes than those held in the general population (Brehm & Rahn, 1997; Glanville, 2016; Park & Subramanian, 2012; Putnam, 2000; Stolle, 1998; Wollebaek & Selle, 2002). However, Uslaner (2002) found that members were no more trusting in general others than non-members, for most association types. Likewise, Claibourn and Martin (2000) found little or no correlation between trust levels and group memberships in a model attempting to ascertain causal effects. Valdivieso and Villena-Roldan (2014) found a negative effect of trust on participation in different associations, thus not supporting the idea of a virtuous cycle between associational activities and the development of trust. Knack (2003) found a significant and positive relationship between trust and membership using cross-country data.

As for experimental research, Ruffle and Sosis (2006) found that Israeli kibbutz members were characterized by bonding social capital, as members were more cooperative than non-members internally (i.e., when cooperating with other members), but not externally (i.e., when interacting with non-kibbutz members). Some experiments aimed to induce a shared identity experimentally by assigning participants to group tasks supposed to induce team identity (Eckel & Grossman, 2005). The results were mixed. Solow and Kirkwood (2002) found, surprisingly, a *negative* effect of team-building on cooperation (compared to baseline) internally, while Pan and Houser (2013) found a strong positive effect, a disparity likely due to the nature of the team-building task. Other studies compared members' pro-sociality with non-members' without making membership salient, showing conflicting results across different countries (Anderson et al., 2004; Carpenter et al., 2004; Kocher et al., 2012). Experimental evidence thus seems to offer mixed results on the relationship between membership and pro-sociality.

The research reviewed above does not generally enable us to assess social capital's bridging vs. bonding nature in groups. First, except for Ruffle and Sosis (2006), it does not compare members' trust internally and externally, or it does so only with groups artificially created in the lab. Ruffle and Sosis (2006) had a construal of the outgroup different from our design and focused on a specific type of association—namely, the Israeli kibbutz. Second, non-experimental research mainly focuses on trust through the standard GSS survey question. It has been pointed out that this question mainly captures beliefs in others' trustworthiness rather than trust (Fehr et al., 2002). Third, non-experimental research mainly focuses on trust, thus neglecting trustworthiness. Putnam (2000) correctly argues that trust must ultimately rest on the counterpart's trustworthiness. It would be

difficult to believe that people whose trust is never repaid would indefinitely continue trusting others. It then becomes crucial to examine not only trust *in* others but also trustworthiness *toward* others. This approach considerably enriches the model of individual motivations (Cox, 2004). Fourthly, even assuming that association members are indeed more trusting than non-members, we know very little about the psychological mechanisms underpinning the "leap of faith" (Stolle, 1998) that members must perform when deciding to trust non-members in the same way as they trust fellow members. Extending ideas from Uslaner (2002) and Yamagishi (2007), who posit that trusting people have above-average optimism in others' trustworthiness, or even gullibility, one may posit that association members put excessive faith in the trustworthiness of others from the general population. A process of cognitive dissonance (Festinger, 1954) may then keep up members' motivation to trust others even when others are not entirely trustworthy. Alternatively, members may hold realistic beliefs on others' trustworthiness but still be motivated by their greater generosity in giving more to others than what they receive back.

Our study addressed this topic involving 264 adult association members and a demographically comparable sample of 111 individuals from the general population, who were not members of associations, in monetarily incentivized experimental choices. We used anonymous Trust Games (TGs) (Berg et al., 1995), which are the standard method to measure trust experimentally. We also collected a measure of beliefs on others' trust and trustworthiness, thus enabling us to shed light on the psychological underpinnings of the decision to trust. We also quantitatively decomposed the social capital observed within associations into a "bonding" component—that is, the level of social capital that remains confined within the association—and a "bridging" component—that is, the level of social capital that is extended to others in the general population. Finally, we evaluated whether greater involvement with associational activities was associated with higher pro-sociality.

Our study was ultimately a test applied to association members of the ingroup bias, that is, the tendency to favor individuals belonging to groups to which an individual perceives to belong (i.e. the insider group, or ingroup), in comparison to others not belonging to such groups, or belonging to a broader category (i.e. the outsider group, or the outgroup). In our experiment, the ingroup was the association to which an individual is a member. While experimental research often constructs the outgroup as an alternative group to the ingroup (such as Republican voters vs. Democrat voters), the group alternative to the ingroup may be either not made salient (Brewer, 1999) or be constructed as a broader category into which the ingroup is nested (Wit & Kerr, 2002). The meta-analysis by Balliet et al. (2014) shows that having a salient outgroup is not necessary to induce ingroup favoritism. We follow the approach of constructing the alternative group to the ingroup as the whole population of residents in the province of the city where our research took place and surrounding provinces. This group, thus, did not exclude our study's ingroup but was a broader superordinate category in which the ingroup was largely negligible. Since this group was almost exclusively made up of people not belonging to the ingroup, we still label it as the outgroup. The outgroup in our experiment was thus psychologically meaningful and substantially different from the ingroup category.

Many studies analyzed inter-group relationships either through experimentally induced group demarcations (Tajfel et al., 1971; Hargreaves-Heap and Zizzo 2009; Chen & Li, 2009), or naturally occurring demarcations, due for instance to ethnic, national, or social belonging (Habyarimana et al., 2007; Romano et al., 2021; Whitt & Wilson, 2007). According to the meta-study by Balliet et al. (2014), the ingroup bias is statistically significant, although the effect size is small (Cohen's d–d henceforth= 0.27). Some of these studies (Fershtman et al., 2005; Hargreaves-Heap and Zizzo 2009) found that the ingroup bias is characterized by "outgroup hate"—namely, a tendency to trust outgroup members less than unidentified others-,[2] rather than "ingroup love"—namely, a tendency to trust ingroup members more than unidentified others. If outgroup hate was widespread and ingroup love absent, the premise that groups are beneficial even "internally," let alone externally¸ would be contradicted. However, the meta-analysis by Balliet et al. (2014) concludes that outgroup hate is rare (see also Brewer, 1999; Weisel & Böhm, 2015).

The paper is structured as follows. Section 2 illustrates the experiment protocol. Section 3 reviews the results, which are discussed in Sect. 4. Section 5 concludes.

2 Research design and hypotheses

2.1 Research design

374 participants took part in the experiment. 263 were association members ('*Members'* henceforth), while 111 were not members ('*Non-members*'). Among Non-members, 77 had never been members of an association ('*Never-members*'), and 34 had been association members in the past but were not members when the research was carried out ('*Dropouts'*). In addition to being formally registered with an association, we required members to attend association meetings for at least one hour each month. The purpose of recruiting dropouts was to assess the relationship between the intensity of involvement with associations and pro-sociality (Karlan, 2001; see Sect. 3.4).

Our objectives in the sampling of associations were, on the one hand, that the associations spanned a broad range of the spectrum in terms of their general goals and type of good being produced, and, on the other hand, to cluster recruitment into a limited number of association types to have sufficient power to discern differences between types. We followed the classification proposed by Knack and Keefer (KK henceforth, 1997) to determine which type of association to include in our sample. In KK classification, CA and TU stand at the opposite extremes of a spectrum ranking associations on the basis of their rent-seeking orientation. TU are typical "Olsonian" associations, as they act as "distributional coalitions" (KK, 1997:

[2] In this literature, participants are typically involved in three interactions with (a) ingroup members, (b) outgroup members, and (c) unidentified others. (c) provides the baseline case against which one can assess the occurrence of ingroup love—when trust in (a) exceeds trust in (c)—or outgroup hate—when trust in (c) exceeds trust in (b)—or both.

1273) aiming to maximize the share of resources accruing to their members by lobbying for preferential treatment (Olson, 1965). On the other side of the spectrum, CA are instead typical "Putnamesque" associations, in that the rent-seeking orientation is absent and activities have both a private and a public component. We also included SW associations, which were not classified by KK (1997) and could then be thought of as forming a third type of associations in addition to Putnamesque and Olsonian associations. On the one hand, the activities of SW have a markedly public-oriented character and, in general, they seem to be free from a rent seeking orientation, as their main goal is to improve the welfare of people affected by illnesses or being marginalized. This makes them similar to Putnamesque associations. On the other hand, the fact that they provide highly valuable services to the government, sometimes in condition of semi-monopsony as may be the case of blood donations, might introduce some elements of rent-seeking behaviour; such rent-seeking may be appropriated by the SW management, rather than by volunteers. Overall, we expected that associations characterized by higher rent-extracting associations and that produce private rather than public goods would fail to create a social fabric of trust and may be divisive.[3]

We sampled ten associations, four of which were CA—three choirs and one folk dance association, four were SW—an association for blood donation, an association for medical research on cancer, an association assisting hospitalized children, and an association dedicated to charity and evangelization, and two were TU (See Supplementary Online Material -SOM henceforth: Section III.1 for a thorough description of the associations).

The authors recruited association members through announcements at association meetings, while recruitment of non-members was sub-contracted to an opinion poll company. The company was instructed to achieve the same demographic quotas with respect to age, gender, and education (up to a 10% tolerance) as the one obtained in the member sample, and to follow as closely as possible the script used in recruiting members (see SOM: Section III.2–3 for additional details on the recruitment strategy, protocol, instructions, and recruitment scripts). Such a recruitment strategy was overall successful, as there were no statistically significant differences between the groups of *Members*, *Dropouts*, and *Never-Members* with respect to the three target demographic characteristics (see SOM: Section I.1 and Table S1 for descriptive demographic statistics). Members were randomly allocated to either the 'Ingroup' treatment or the 'Outgroup' treatment.

Given the expected low computer literacy of participants, all experiments were conducted with "pen and paper". We carried out 25 experimental sessions with a minimum of 6 and a maximum of 26 participants (15 participants on average). Experimental sessions were run in parallel by the two experimenters at two different rooms at the library of the University of Parma (minimum 3 and maximum 19

[3] We analyzed differences between types of association in a companion paper (Degli Antoni and Grimalda, 2016). We found that members of TU tended to display bonding behavior with respect to trust, and bridging behavior with respect to trustworthiness. In the present paper, we provide a general analysis across associations, also investigating the moderating impact of beliefs on others' behavior.

participants per room), following the same experiment script. We took care that participants in the two rooms did not meet each other before the start of the sessions. The research session lasted around 75 min. Average payoffs were 31.7 Euros (std. dev. 11.99). In three cases did a participant in the pair earn nothing while the other earned the maximum available amount—75 Euros.

Each participant made a choice both as a sender and as a receiver. We applied the strategy method to collect receivers' choices, so participants had to indicate in a form the amount they wished to return for each of the possible six options available to the sender. (See SOM: Section III.3c for details on the order of choices, participants random matching into pairs, and payoffs). Both senders and receivers were endowed with 25€. Senders could transfer to the receiver any multiple of 5€ from 0€ to 25€. We call this variable *Amount Sent* (*AS* henceforth). The transferred amount was multiplied by two and allocated to the receiver. Receivers indicated the amount they wished to return for each of the possible six options available to the sender. Receivers could send back any amount between zero and the maximal returnable amount (MRA). The MRA equals the amount sent multiplied by two, plus the €25 endowment. We used a multiplicative factor of two, instead of the customary factor of three, mainly for budget constraints. In their meta-analysis, Johnson and Mislin (2011) show that decreasing the multiplicative factor from three to two does not affect the amount sent while having a positive effect on returns. We analyze trustworthiness using the *Return rate* (*RR* henceforth). That is the amount returned divided by the MRA.

Having participants acting both as senders and receivers permits a higher number of observations at lower financial costs, but could lead to uncontrollable effects due, for example, to moral licensing (Merritt et al., 2010) or other uncontrollable effects due to the concatenation of decisions. Burks et al. (2003) found that participants playing both roles in a TG sent back on average less to their counterparts when acting as receivers than those only playing as receivers. No effect emerged for AS. They explain the reduction in trustworthiness as led by participants feeling lower responsibility toward senders, because senders' payoffs is the result of two rather than one decision. In their meta-analysis of TGs, Johnson and Mislin (2011) found no effect of participants playing both roles on AS, and a significant reduction in RR, which, however, emerges only in some of the specifications proposed.

We took particular care that the decisions as senders and receivers were treated independently by participants, thus minimizing the risk of strategic behavior across decisions. Contrary to Burks et al. (2003), in which participants know they will play both roles in the TG, in our experiment participants were unaware of that. Since all participants acted as senders in their first decision, we believe we can rule out any bias in *AS* decisions induced by the multiple-choice setting. Moreover, no feedback was given after participants acted as senders. It was also specified that the participant's counterpart when acting as a sender would have been different to the counterpart when acting as a receiver. This aspect of the design should rule out the possibility of any possible reciprocity or expectation effect between decisions (Buchan et al., 2002; Foddy et al., 2009). Even if we can conjecture a reduction in RR due to participants playing in both roles (Johnson & Mislin, 2011), it is not clear why members and non-members should react differently to this aspect of the design.

After the two experimental choices, we elicited participants' beliefs. Participants were asked to guess the amount returned by their counterparts in relation to the amount they had sent and to guess the amount sent by another randomly selected participant. Beliefs elicitation was monetarily incentivized (see SOM: Section III.3A). Finally, we administered the attitudinal and demographic questionnaire (SOM: Section III.3.D).

Our treatments varied the composition of the pairs in the TG. Only members took part in the Ingroup treatment. Participants were informed they were matched with a member of the same association from which the experimenters had contacted them and that this person was participating in the other room. Instructions read: "The person with whom you will be paired is a member of the Association X {researcher states the name of the association} of which you are also a member, and is resident in Parma, or its province, or in neighbouring provinces. He was asked to take part in the research in a similar way as you have been contacted." The Outgroup treatment included both members and non-members. No mention was made of the fact that some people were association members and some were not. Instead, instructions highlighted that participants had been contacted from a large cross-section of residents of the province of Parma and surrounding provinces by specifying that "The person with whom you will be paired is resident in the province of Parma or in neighbouring provinces. This person has been contacted within a large sample of people of Italian citizenship residing in Parma, or its province, or in neighbouring provinces. We have contacted more than a thousand people from various age groups and socio-economic status, to participate in this research". A control question included in the questionnaire asked participants to state whether they thought they knew people present in the other research room personally. Around 41% (7%) of members participating in the Ingroup (Outgroup) treatment answered positively to such a question. This difference is statistically significant ($p < 0.001$; chi-square test; all tests reported are two-tailed) and confirms the significantly higher social distance that members experienced in the Outgroup than in the Ingroup treatment.

2.2 Hypotheses

Based on the literature review in Introduction, we can put forward the following hypotheses:

- Hypothesis 1 (H1) (Bonding social capital): Association members involved in the Ingroup treatment trust and repay trust more than people from the general public.

H1 rests on the idea that associations permit the inculcation of norms of cooperation and reciprocity among their members because it is ultimately in their self-interest to cooperate when interactions are frequent and repeated over time (Putnam, 2000). One may also posit that H1 rests on self-selection, that is, more trusting individuals are more likely to join associations. Even if our design cannot

disentangle between these two motives, both are concordant in determining a higher propensity to trust and repay trust by association members relative to the population at large.

- H2 (Bridging social capital): H2a (Main hypothesis): No ingroup effect for members: Association members involved in the Outgroup treatment trust and repay trust at the same rate as association members involved in the Ingroup treatment. H2b (Corollary): Members' higher pro-sociality in Outgroup: Association members involved in the Outgroup treatment trust and repay trust more than people from the general public.

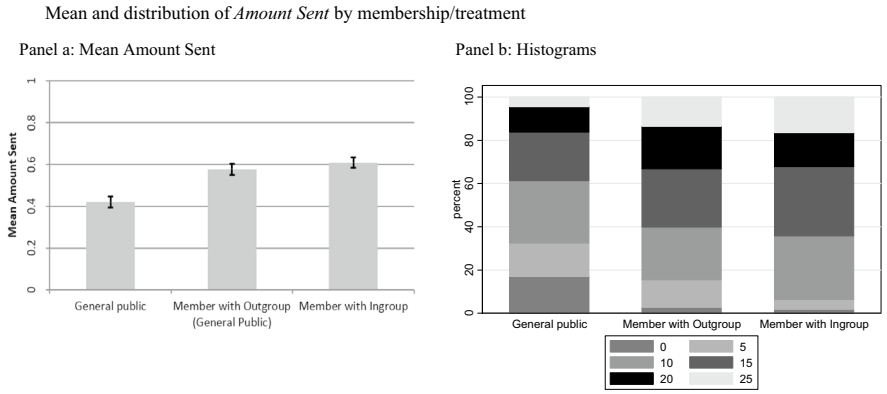
H2 rests on the fundamental tenet of social capital theory that association members extend the norms of cooperation and reciprocity learned within associations to the rest of society. Taking this hypothesis literally means that we should observe no ingroup effect by members (see Sect. 1). In other words, we should observe statistically similar levels of trust and trustworthiness when association members interact with fellow group members and with people from the general public in the TG (H2a). A consequence of this hypothesis is that we should observe higher levels of trust and trustworthiness by association members involved in the Outgroup treatment than people from the general public (H2b).

- H3 (Members' optimism): Association members are overly optimistic when interacting with people from the general public, i.e., they expect the same amount of trust and trustworthiness from people from the general public as they expect from fellow group members.

Lacking previous evidence on the topic, we base this hypothesis on the intuition given by Uslaner (2002) and Yamagishi (2007) in their construal of trusting individuals' psychology (Sect. 1). We posit that association members' expectations of others' pro-sociality are correct with respect to other association members but turns out as excessively optimistic with respect to people from the general public.

- H4 (Associations formative effect on pro-sociality): The higher involvement in associations—in terms of years of membership, time spent within the association, and the number of associations joined—the higher members' trust and trustworthiness.

Another key tenet of social capital theory is that association membership has a causal role in instilling higher pro-sociality in individuals attending associations (see SOM: Section I.5 for a review of the literature). As with H1, a reverse causality effect may, however, be relevant: More pro-social individuals are more likely to engage more with associations. Even if we cannot disentangle these two different drivers, both are concordant in predicting a positive correlation between pro-sociality and involvement with the association.



Notes: Bars represent standard error of the mean in Panel (a).

Fig. 1 Mean and distribution of *Amount Sent* by membership/treatment. Bars represent standard error of the mean in Panel (**a**)

The dataset, the codes to reproduce the analyses, and the analyses output, are stored at this repository of the Open Science Foundation: https://osf.io/nt9g8/?view_only=9e45012608b846b3a663c6a7c25f21db

The research adheres to ethical guidelines specified in the APA Code of Conduct as well as authors' national ethics guidelines. More details on ethical procedures can be found in the SOM: Section III.3.B.

3 Results

3.1 Is social capital by association members higher than in the society at large?

On average, members sent 61.2% of their endowment in the Ingroup treatment (Fig. 1, Panel a), while Non-members sent 42% of their endowment. (see Fig. 1, Panel b for histograms; SOM: Tables S3 and S5 for the breakdown of *AS* by association). This corresponds to a medium to large effect size in terms of Cohen's $d = 0.72$, Bootstrapped Std. Err. (BSE henceforth) = 0.12, Confidence interval (CI henceforth) = [0.48, 0.97].

We use econometric analysis to evaluate the differences in behavior between members and non-members. Given the nature of count data for *AS* and its likely overdispersion with respect to a Poisson process, we deploy negative binomial regressions (see SOM: Section I.2 for further details on the econometric models) in the following specifications:

$$AS_i = \text{Const.} + \alpha\text{MEMBER}_i + X_i\prime\delta + \varepsilon_i, \tag{1}$$

$$AS_i = \text{Const.} + \beta\text{MEMBER\_ING}_i + \gamma\text{MEMBER\_OUT}_i + X_i^{'}\delta + \varepsilon_i. \tag{2}$$

Table 1 Analysis of amount sent (AS) and return rate (RR): effects of membership and treatment—extract

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable	*AS*	*AS*	*AS*	*RR*	*RR*	*RR*
Member	3.81***			0.083***		
	(1.31)			(0.030)		
Member_Ing		4.80***	3.04**		0.10***	0.070**
		(1.19)	(1.21)		(0.034)	(0.032)
Member_Out		3.19***	3.08***		0.072**	0.067**
		(1.13)	(1.15)		(0.031)	(0.029)
Amount Sent Exp			0.59***			0.0088***
			(0.075)			(0.0025)
Return Rate exp			5.29***			0.19**
			(1.99)			(0.081)
Demographics	Yes	Yes	Yes	Yes	Yes	Yes
Result of Wald test on H_0: $\beta_{Member\_Ing} - \beta_{Member\_Out} = 0$		1.60** (0.66)	−0.035 (0.59)		0.032 (0.024)	0.002 (0.02)
Observations	320	320	318	1,920	1,920	1,908
Pseudo-R^2/Chi^2	0.031	0.032	0.079	418.6	426.0	572.8

Columns 1–3 report the Average Marginal Effects (AME) for the key variables of interest for the Negative Binomial regressions described in Eqs. (1) and (2). The complete output is reported in SOM: Table S6, column 1–2 (for Table 1, columns 1 and 2) and in Table S11, column 3 (for Table 1, column 3). AME are computed averaging over the marginal effects of all the observations using the delta-method. Columns 4–6 report coefficients for panel Tobit regressions described in Eqs. (3) and (4). The complete output is reported in SOM: Table S6, column 3–4 (for Table 1, columns 4–5) and in Table S11, column 6 (for Table 1, column 6). Reported are also results on Wald tests on the null hypothesis of equality of coefficients between *Member_Ing and Member_Out.* Standard errors clustered at the session level are reported in brackets

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

The index i denotes the individual. MEMBER_i is a dummy variable identifying currently active members. MEMBER_ING_i and MEMBER_OUT_i are dummy variables identifying Members participating in the Ingroup and Outgroup treatments. X_i is a vector of covariates including demographic characteristics and a dummy variable identifying Dropouts. 'Never member' is therefore the residual category of the model. Since we did not find significant differences between Never-members and Dropouts (Sect. 3.4), we normally compare members with Non-members—which includes both Never-members and Dropouts.

Table 1 reports the Average Marginal Effects (AME) for the variables of main interest in our analysis (see SOM: Table S7 for AME of the full list of covariates). The first specification (Table 1, column 1) shows that members' *AS* is overall significantly higher than non-members'*AS* ($p = 0.001$). In the second specification (Table 1, column 2), the coefficient for $MEMBER\_ING_i$ is positive and significantly different from zero ($p < 0.001$). This means that members trust fellow members significantly more than a non-member trusts an individual from the general population,

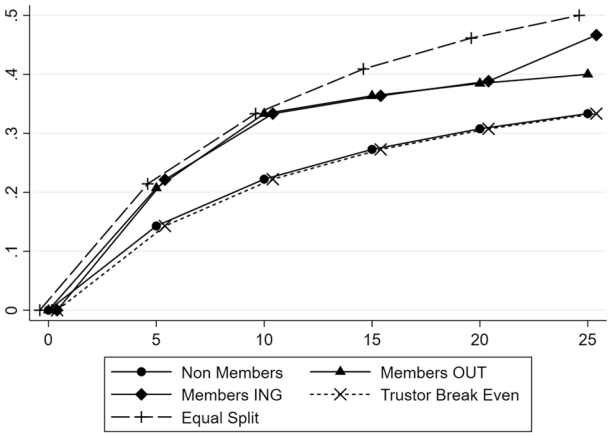


Fig. 2 Median return rates per membership/treatment. The long-dashed line identifies the "Equal Split" return rate, i.e., the return rate that would allow sender and receiver to receive equal payoffs. The short-dashed line represents the "Trustor Break Even" return rate, i.e., the return rate that makes the amount returned equal to the amount sent to the sender. The "Members ING", "Trustor Break Even" and "Equal Split" lines have been jittered to make their markers visible

consistently with H1. These results hold controlling for a large set of demographic and behavioral characteristics, as well as for the identity of the experimenter conducting the session (SOM: Table S6 and Section I.3).

We now turn to the analysis of receivers' choices. We observe a sequence of choices $\left\{RR_{AS}\epsilon[0,1]|A\epsilon\{0;5;10;15;20;25\}\right\}$ for each receiver, where RR_{AS} denotes *RR* when receiving an amount of *AS* Euros from the sender. Each RR_{AS} is scaled on the [0,1] interval, thus ensuring their comparability. We report descriptive statistics for RR_A in SOM: Tables S4A-4G and Table S5.

Figure 2 plots the median *RR* observed for members—broken down by treatment—and non-members for each of the possible transferred amounts. The median non-members' *RR* coincided with break-even for any of the six possible transferred amounts. This means that 50% of the times a sender who was matched with a non-member ended up in a loss, consistently with Bellemare and Kröger (2007). On the contrary, the median members' *RR* in the Ingroup treatment was always above the break-even line for members, and coincided with the equal split for all *AS* lower than or equal to €10. Figure 3 reports histograms and density for Non-Members and Members (conflating Ingroup and Outgroup treatments). It is noteworthy that the modal choice is the same for Members and Non-Members for each possible level of *AS*. Nonetheless, with the exception of $AS=0$, the distribution of *RR* is always skewed to the right significantly more for Members than non-Members, as brought out by Mann–Whitney non-parametric tests over the equality of the distribution of *RR* between members and non-members.[4] A visual inspection of Fig. 3 reveals that

[4] The null hypothesis of equality of distribution in RR between Members and non-Members is not rejected for $AS=0$ (z = -1.03, p = 0.30, N = 374), while it is always rejected at $p<0.001$ for $AS=5$ (z = -3.87, N = 373), $AS=10$ (z = -4.11, N = 373), $AS=15$ (z = -4.51, N = 373), $AS=20$ (z = -5.12, N = 373), and $AS=25$ (z = -4.27, N = 373).

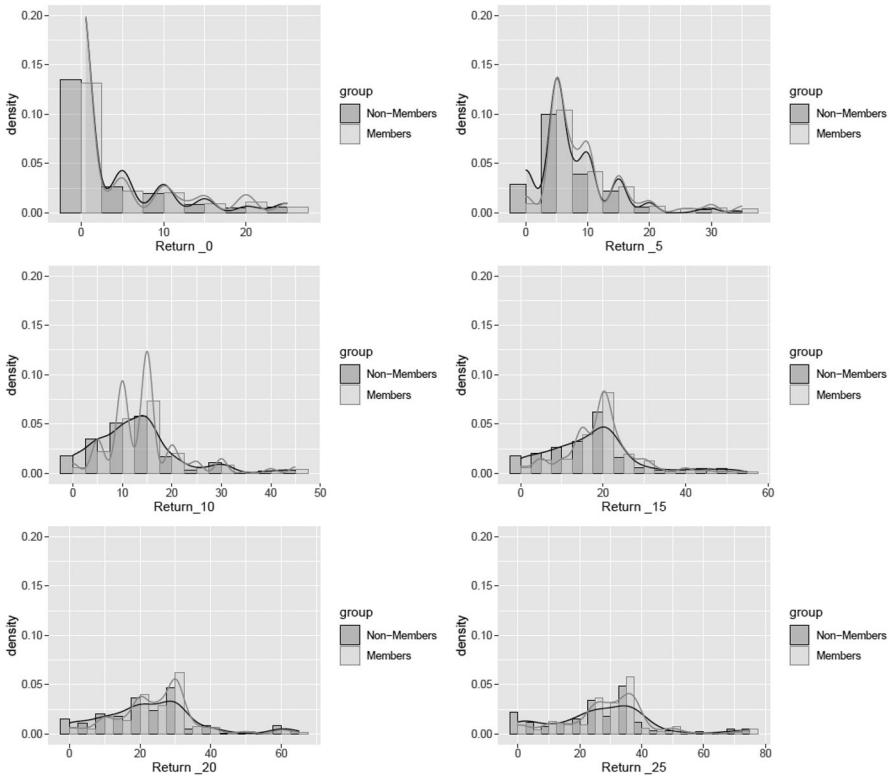


Fig. 3 Distribution of amount returned per membership/treatment

the difference in distribution between Members and Non-Members lies in a lower proportion of Members returning zero in comparison to Non-members, and in a larger proportion of Members than Non-Members returning central values in the distribution. It is also noteworthy that, for any $AS > 5$, relatively few participants return the sum corresponding to the sender's break-even point. The result that the median *RR* for non-members is that leading to the sender's break-even point is, therefore, not caused by a disproportionate share of Non-Members selecting exactly this value.

Averaging over all possible transfer levels, members returned on average 34% of their MRA in the Ingroup treatment, about 40% more than what non-members returned—namely, 24.3% of their MRA.[5] This corresponds to a medium effect size ($d = 0.54$, BSE = 0.14, CI = [0.25,0.82]).

We further analyzed differences in trustworthiness between members and non-members through a Tobit regression with random effects:

[5] This value for *RR* is quite lower than what found by Johnson and Mislin (2011) in their meta-analysis of 137 TGs (mean = 37.2%). However, the variability of *RR* in TGs can be quite high, between a minimum of 10.8% and a maximum of 81.2% (Johnson and Mislin 2011).

$$RR_{Ai} = Const. + \gamma_1 AS_j + \gamma_2 \left(AS_j\right)^2 + \alpha \text{MEMBER}_i + X_i\prime\delta + \vartheta_i + \theta_{ai}. \quad (3)$$

$$RR_{Ai} = Const. + \gamma_1 AS_j + \gamma_2 \left(AS_j\right)^2 + \beta \text{MEMBER\_ING}_i + \gamma \text{MEMBER\_OUT}_i + X_i\prime\delta + \vartheta_i + \theta_{ai}. \quad (4)$$

Equation (3) models an individual's trustworthiness, i.e., her latent propensity to reward trust. RR_{Ai} is the vector of six choices of *RR* for each of the six possible levels of *AS*. The independent variables include AS_j and $\left(AS_j\right)^2$ to control for the possibility that trustworthiness varies non-linearly in *AS*, as in Bellemare and Kröger (2007). The other independent variables have the same meaning as in the Eqs. (1) and (2). ϑ_i and θ_{ai} are an individual-specific and an idiosyncratic error term, respectively (see SOM: Section I.2).

Members are overall more likely to return higher sums to senders, given a certain transfer by the sender, than non-members ($p=0.006$; Table 1, column 3). This is in particular the case for *MEMBER_ING* ($p=0.002$; Table 1, column 4), indicating that members returned significantly more to fellow group members than an individual from the general population returned to another individual from the general population.

We can thus conclude:

Result 1: Association members trust fellow association members more than individuals from the general population trust other individuals from the general population. Likewise, association members are more trustworthy with their fellow association members than individuals from the general population are trustworthy with other individuals from the general population. This supports H1.

3.2 Is association members' social capital bridging?

We tested for H2 deploying the same models described in Sect. 3.1. The distributions of choices by members in the Ingroup and Outgroup treatments appear similar (Fig. 1a). Members sent on average 57.9% of their TG endowment in the Outgroup treatment, which is 3.3% less than what they sent in the Ingroup treatment ($d=-0.12$, BSE$=0.12$, CI$=[-0.11,0.36]$) and 15.9% more than what members of the general public sent to one another ($d=0.59$, BSE$=0.13$, CI$=[0.34,0.84]$). Even if members' reduction in sending rate between Ingroup and Outgroup treatment only had a small effect size, it was statistically significant ($p=0.015$; Table 1, column 2). Nonetheless, members sent significantly more to people from the general public than non-members ($p=0.005$; Table 1, column 2).

As for *RR*, Fig. 2 shows that the median responses by members was virtually the same in the Ingroup and Outgroup treatments. Members' *RR* in the Outgroup treatment was 2.7% lower than in the Ingroup treatment ($d=-0.15$, BSE$=0.13$, CI$=[-0.41,0.10]$) and 7% higher than non-members ($d=0.42$, BSE$=0.13$, CI$=[0.16,0.68]$). Fitting econometric model (4) to the study of *RR* yielded an insignificant difference between *RR* by members in Ingroup and Outgroup treatments ($p=0.18$; Table 1, column 5), while members' *RR* was significantly higher than

non-members in the Outgroup treatment ($p=0.021$). We analyze heterogeneity in results across associations in the SOM: Section I.4 and Figure S1.

We can thus conclude:

Result 2a: Association members trust people from the general public less than they trust fellow association members. The effect size is small but statistically significant. Nonetheless, they trust people from the general public significantly more than people from the general public trust one another, the effect size being medium.

Result 2b: Association members return to people from the general public lower amounts than what they return to fellow association members, but the effect is statistically insignificant and small in size. Their return rate is significantly higher than the return rate by people from the general public, the effect size being medium.

We can quantify the bonding and bridging character of association members' trust and trustworthiness by measuring the percentage increase of *AS* and *RR* by members in the Ingroup and Outgroup conditions in comparison with non-members' *AS* and *RR*.[6] *AS* increased by 45.7% when members interacted with members in relation with *AS* by the general population. Members interacting with people from the general public trusted on average 37.9% more than individuals in baseline. Therefore, we can conclude that 83% of the additional social capital existing in associations in comparison with the society at large was *"bridged"* to the society as a whole, while 17% remained confined within associations and was therefore bonding. Similar computations for *RR* entail that 71% of social capital was bridging, while the remaining 29% was bonding.

3.3 Analysis of beliefs over others' behavior

We define the forecast error FE_i^k by agent i over an action k as the difference between $E_i(x_k)$—namely, a participant i's expectation over others' behavior in a certain treatment—and $\bar{x}_k$—namely, the average behavior actually observed in the experiment treatment for the corresponding action[7]:

$$FE_i^k = E_i(x_k) - \bar{x}_k. \tag{5}$$

Overall, both members and non-members appear to have been fairly accurate in their predictions. The median value for each of these measures is close to zero for both groups (Fig. 4). Non-parametric tests conducted on $\left|FE_i^k\right|$ failed to reject the hypothesis that members were more accurate in the Ingroup than in the Outgroup treatment in their estimation of both expected *RR* ($z=1.10$; $p=0.27$; $d=-0.07$,

[6] For this computation, we use the mean *AS* and *RR* for each group and condition. Using effect sizes or regression coefficients would yield similar results.

[7] For participants involved in the Outgroup treatment, we take a weighted average of actions by members and non-members. The weights reflect the actual relative number of association members over the total population in the province of Parma. 11.22% of Parma residents were active voluntary members of some associations, as per data from the Italian Statistical Office (http://dati-censimentoindustriaeservizi.istat.it/Index.aspx# and http://dati-censimentopopolazione.istat.it/Index.aspx?lang=it; accessed: 04.30.2021).

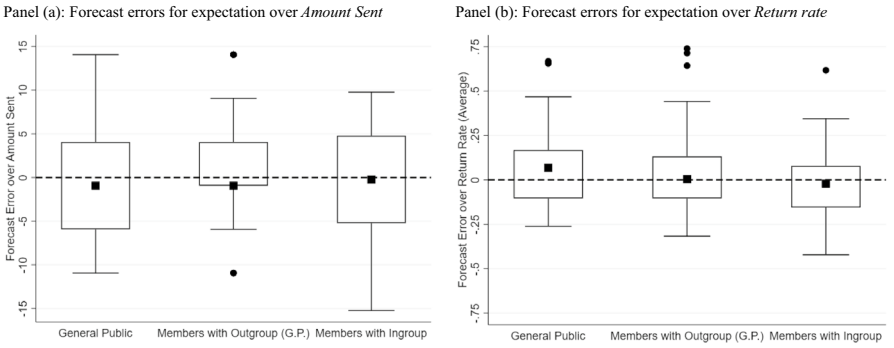


Fig. 4 Box plots for error forecasts over *Amount Sent* and *Return rate* by treatment and membership status. Panel (**a**) and panel (**b**) report box plots for forecast errors (FE) on *AS* and *RR*, respectively. Panel (**b**) reports the average over the six possible forecast errors for each *RR* level, with weights given by the proportion of participants sending a certain amount AS = {0, 5, 10, 15, 20, 25}. The box upper (lower) hinge identifies the 75th (25th) percentile. The square inside the box identifies the median of the distribution. The upper (lower) whiskers departing from the box identify the upper (lower) adjacent values. The circles lying above or under the hinges identify outside values

BSE = 0.13, CI = [−0.32,0.17]) and expected *AS* ($z = 1.13$; $p = 0.26$; $d = -0.17$, BSE = 0.13, CI = [−0.42, 0.08]). Likewise, members were as accurate as non-members in predicting *RR* by people from the general public in the Outgroup treatment ($z = 0.70$, $p = 0.48$; $d = 0.13$, BSE = 0.13, CI = [−0.12, 0.38]) and were actually significantly more accurate than non-members in predicting others' *AS* ($z = 2.41$, $p = 0.016$), the effect size being small ($d = 0.26$, BSE = 0.13, CI = [−0.02, 0.51]).

Econometric analysis confirms these results. We fitted a Tobit model to analyze beliefs over receivers' *RR* and a Negative Binomial model to analyze beliefs over *AS*:

$$RR_i^{EXP} = \text{Const.} + \beta\text{MEMBER\_ING}_i + \gamma\text{MEMBER\_OUT}_i + X_i'\delta + \varepsilon_i. \quad (5)$$

$$AS_i^{EXP} = \text{Const.} + \beta\text{MEMBER\_ING}_i + \gamma\text{MEMBER\_OUT}_i + X_i'\delta + \varepsilon_i. \quad (6)$$

The variables have the same meaning as those in models (1)–(4).

In both regressions, there was no significant effect of *MEMBER_OUT*, denoting that non-members and members involved in the Outgroup treatment did not hold significantly different beliefs over others' actions. Conversely, a Wald test carried out on the difference between *MEMBER_ING* and *MEMBER_OUT* coefficients rejected the null hypothesis that the two coefficients were the same both with respect to expected *AS* ($p = 0.006$; Table 2, column 2) and expected *RR* ($p = 0.040$; Table 2, column 1). Hence, members correctly anticipated that fellow members would have been both more trusting and more trustworthy than people from the general public.[8]

[8] Results are the same analysing the share of *optimists*—i.e., those for whom FE > 0 –in non-parametric tests. Members were no more optimistic (or pessimistic) than non-members when interacting in the Outgroup treatment for both *RR* (p = 0.85) and *AS* (p = 0.45). Members were significantly less optimistic when interacting with people from the general public than with fellow members for both *RR* (p = 0.0102) and *AS* (p = 0.0017).

Table 2 Tobit analysis of beliefs over return rate and negative binomial regression of beliefs over amount sent—extract

Dependent variable	Return rate exp	Amount sent exp
	(1)	(2)
Member_Ing	0.045*	2.70***
	(0.026)	(0.86)
Member_Out	−6.73e-05	0.58
	(0.025)	(0.83)
Demographics	Yes	Yes
Result of Wald test on H_0: $\beta_{Member\_Ing} - \beta_{Member\_Out} = 0$	0.045**	2.12***
	(0.022)	(0.77)
Observations	318	319
F/*Pseudo-*R^2	2.258	0.0285

Column 1 reports coefficients for key variables of interest from the Tobit model in Eq. (5). The censoring values for *Return Rate Exp* are 0 and 1. The complete output is reported in SOM: Table S11, column 1. Column 2 reports AME (see Table 1) for the Negative Binomial regression described in Eq. (6). The complete output is reported in SOM: Table S11, column 2. Standard errors robust to heteroscedasticity clustered at the session level are reported in parentheses

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

The lack of significant differences in beliefs over counterparts' behavior by members and non-members in the Outgroup treatment suggests that beliefs did *not* account for their differential behavior in trust and trustworthiness. Indeed, the key results concerning differences in *AS* and *RR* between members and non-members were unaffected by introducing beliefs in models (2) and (4). As posited, expecting the receiver to return more had a strongly significant and positive effect on *AS* ($p = 0.007$; Table 1, column 3). The introduction of beliefs decreased the coefficients for '*Member_Ing'* in predicting *AS* and *RR* by about a third (Table 1, columns 2–3 and 5–6), but both *AS* ($p = 0.014$) and *RR* ($p = 0.029$) remained statistically significant. Coefficients for '*Member_Out'* marginally decreased in predicting *AS* and *RR*, respectively (Table 1, columns 2–3 and 5–6) and they also remained significant ($p = 0.008$ for *AS*; $p = 0.020$ for *RR*). The beliefs on other senders' behavior also significantly increased *AS* ($p < 0.001$; Table 1, column 3), thus confirming the importance of social norms in influencing individual behavior (as in Bohnet & Baytelman, 2007).

This analysis supports the view that members had an intrinsic *taste* for relying on others and repaying trust, rather than being driven by their expectations on others' behavior. These results were robust to the introduction of a broad range of additional controls (Table S11, columns 5–6). We conclude:

Result 5: Members and non-members have no significantly different beliefs over counterparts' behavior when interacting with people from the general public. Members have nonetheless significantly higher expectations over both trusting and trustworthy behavior when interacting with their fellow members.

Overall, beliefs cannot explain members' higher trust and trustworthiness toward others than non-members, neither in Ingroup nor in Outgroup interactions.

3.4 Is higher involvement with association activities correlated with higher pro-sociality?

We test for H4 using a variety of indicators for involvement in associations. Firstly, we assessed the effect of the number of years spent in associations by an individual, expressed as a percentage of their age (*Years* henceforth). *Years* was not a significant predictor of either *AS* ($p=0.57$; SOM: Table S13, column 1) or *RR* ($p=0.16$; SOM: Table S13, column 4), the sign being in fact the opposite to what is expected. The effect sizes, computed as standardized differences of the means for those having years of membership above and below the sample median, were small for *AS* ($d=-0.19$, BSE$=0.13$, CI$=[-0.44,0.05]$) and negligible for *RR* ($d=-0.07$, BSE$=0.12$, CI$=[-0.17,0.32]$). *Years* was also an insignificant predictor of behavior in both the Ingroup and the Outgroup treatment (SOM: Table S13, column 2 and 4). Different specifications capturing possible non-linearities in the effect of *Years* yielded similar results (SOM: Table S13, column 3 and 6). Two other measures of involvement in associations—i.e. the number of hours spent in associations per week and the number of associations of which one is member—were either insignificant predictor of either *AS* or *RR*—or significant with the opposite sign than expected (SOM: Section I.5 and Tables S14–S17).[9] Moreover, Dropouts' experimental choices were indistinguishable from Non-Members' choices, and how far back in time an individual dropped out of associations was also an insignificant predictor of both *AS* and *RR* (SOM: Section I.5 and Table S12). This result contradicts the hypothesis that association membership may have a long-lasting effect on association members. We conclude:

> Result 6: We do not find any effect of increased involvement of association membership on increased trust or trustworthiness.

3.5 Expected payoffs

Figure 5 plots a sender's expected payoff when interacting with a non-member, a member involved in the Ingroup treatment and a member involved in the Outgroup treatment, based on the actual *RR* observed in our experiment. It is striking that the payoff-maximizing strategy for a sender matched with a receiver from the general public is to send nothing, and that senders can expect a net loss on their initial endowment if they send more than €15. On the contrary, the sender payoff-maximizing strategy when matched with a member in an Ingroup treatment is to send the whole endowment. Expected payoffs when the receiver was an association member in the Outgroup treatment followed closely expected payoffs in the Ingroup

[9] Hours spent volunteering were also uncorrelated with experimental cooperation or trust in both Anderson et al. (2004) and Glaeser et al. (2000).

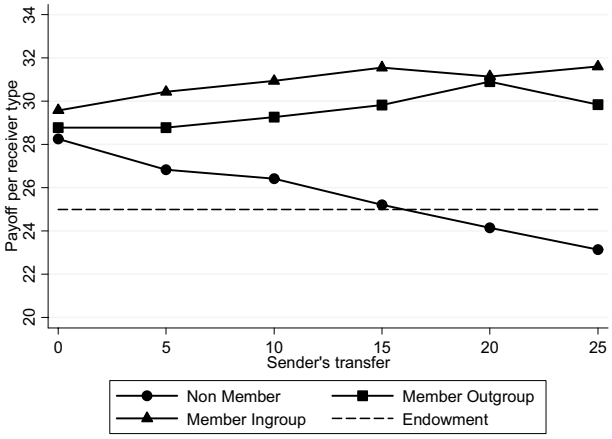


Fig. 5 Average payoffs per membership/treatment

treatment, although the payoff-maximizing strategy was in this case sending €20 rather than €25.

4 Discussion

Experiments are normally evaluated in terms of internal and external validity. As for internal validity, participants' comprehension was carefully tested, and our econometric analysis always controls for the number of errors in the comprehension phase (see Sect. 3.6 and SOM: Table S2). The monetary endowment of €25 was appropriate for adult participants, as the average hourly wage for Italian employees was €11.2 in 2013.[10] We strove to minimize contagion effects[11] by scheduling sessions involving participants from the same association into a short time span, typically no longer than a couple of days.

As for external validity, a self-selection bias may have occurred if those accepting our invitation to attend our research were more pro-social than those who did not. The attrition rate (i.e., the ratio between association members who were present at our recruitment meeting and did not come to our session, and all those attending our recruitment meeting) was very low for small associations and higher for larger associations. However, no pattern in terms of association size can be detected (see SOM: Table S8–9). Only one participant decided to leave the research session. Although we cannot quantify the magnitude of such self-selection bias, we note that studies explicitly measuring the behavioral bias in pro-sociality between individuals who

[10] Data for the average hourly wage are drawn from a study commissioned by the Italian Parliament: https://www.camera.it/application/xmanager/projects/leg18/attachments/upload_file_doc_acquisiti/pdfs/000/001/840/Memoria_INAPP.pdf

[11] Contagion effects occur when members who participated in research communicate with future participants about the contents of the experiment.

voluntary self-select into experiments and those who do not demonstrate that such biases are negligible (Snowberg & Yariv, 2021). Attrition among non-members was in line with that observed in opinion polls research.

Some have argued that individuals tend to act more pro-socially when being put "under the lenses" of the researcher than otherwise (Galizzi & Navarro-Martinez, 2019). However, Snowberg and Yariv (2021) find no evidence for such an "observer effect". They also note that the correlations among relevant variables are not significantly different between samples of self-selected participants and samples of the general population. This suggests that, even admitting that social desirability effects may have been relevant, they should not significantly affect treatment effects.

A limitation of our study is the lack of cross-national comparisons. Glanville and Shi (2020) find that trust travels less easily from known others to people in general in collectivist cultures than in individualist cultures. Hofstede et al. (2005) classify Italy as a fundamentally individualist culture,[12] albeit with significant differences between more individualist Northern regions and more collectivist Southern regions. Therefore, we can conjecture that bonding social capital may be higher in more collectivist countries than Italy than what found in this study.

An interpretation of our results through the lenses of evolutionary theory is that associations have a prominent role in "sorting" individuals with high pro-sociality, enabling them to reap the benefits of mutual cooperation. It is evident from Fig. 5 that trust would disappear in a society where everyone acted as non-members, because the payoff-maximizing strategy would be not to trust. It is the presence of association members in a society that makes trust a profitable strategy in Outgroup interactions. Sorting into associations may be thus necessary for hard-wired altruistic individuals to reap higher-than-average payoffs in the ingroup, thus averaging off the lower gains experienced with non-members in the society at large. This result confirms the claim by theories of cultural evolution stressing the advantages of segregation for pro-social people (Boix & Posner, 1998; Bowles & Gintis, 1998; Nowak, 2006).

5 Conclusions

The goal of this study was to test experimentally the claim that association members are more pro-social than people from the general population and that they are equally trusting and trustworthy with members and non-members. We found compelling evidence that association members are indeed significantly more trusting and trustworthy than non-members, thus confirming that associations are depositories of higher social capital than the society at large. We also found that a substantial part (83% for trust and 71% for trustworthiness) of such social capital was "bridged" to

[12] Italy scores 76 on the individualism scale by Hofstede et al. (2005). As a term of comparison, the US, one of the most individualist countries, scores 91, while China, one of the most collectivist countries, scores 20 on this scale. Data from https://www.hofstede-insights.com/country-comparison/, accessed on 3rd October 2022.

the rest of the population, as association members interacting with the general public were significantly more trusting and trustworthy than the general public. Hence, most of the social capital existing within associations did not remain confined within the association, but spilled over—for its most part—to the society at large. We also demonstrated that this pattern of behavior was not driven by members' excessive optimism or gullibility, but by an intrinsic taste for generosity. Members' predictive accuracy of others' behavior is no less, and in some cases higher, than non-members'. More research should ascertain whether the same holds for other types of groups.

It was not the purpose of this study to directly test for a causal effect of association membership on trust. Our study is therefore silent on the issue of whether associations actually educate people to higher pro-sociality, or whether more pro-social people self-select into associations. The observation that greater involvement with associations was not associated with greater members' pro-sociality, and that drop-outs did not display higher pro-sociality than non-members, seem to contradict this hypothesis. On the other hand, a Structural Equation Model analysis performed in a companion paper (Degli Antoni and Grimalda, 2016) appears to show a significant positive impact of the path leading from membership to prosociality and no significant impact of the path going in the opposite direction. Several studies have found problematic to instill social capital through policy interventions (Avdeenko & Gilligan, 2015; Ostrom, 2000). Our evidence pointing to more prosocial individual self-selecting into associations also cast doubts on the effectiveness of policy programs stimulating group membership. Nevertheless, the observation that associations are depository of bridging social capital, and that their members' prosociality is essential for trusting actions to be economically beneficial in societies, make associations a worthy target of social policy.

Supplementary Information The online version contains supplementary material available at https://doi.org/10.1007/s11238-023-09971-7.

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Data availability The dataset, the codes to reproduce the analyses, and the analyses output, are stored at this repository of the Open Science Foundation: https://osf.io/nt9g8/?view_only=9e45012608b846b3a663c6a7c25f21db

Declarations

Conflict of interest The authors declare no conflict of interest.

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