

Institutional Quality Causes Generalized Trust: Experimental Evidence on Trusting under the Shadow of Doubt

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Abstract: *Generalized trust is essential for collective action, which is at the heart of many societal problems. Institutional quality has been proposed as a driver of generalized trust, but while the correlation between the two is strong and robust, the evidence on the causal link is scant. We show that this relationship is causal. We first experimentally expose individuals to institutions of different quality, operationalized as their ability to prevent corrupt behavior. We then measure generalized trust using a trust game. The results show that institutional quality drives generalized trust and that this effect is generated by the mere doubt that corrupt behaviors might succeed, even without knowledge of occurrence or success of such behaviors. Cross-country comparisons with novel data support our results. Our contributions are the first causal experimental evidence on the link between institutional quality and trust and a novel experimental design for modeling institutional quality in laboratory settings.*

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Generalized trust underlies virtually any social interaction, laying the premises for social and economic prosperity (Algan and Cahuc 2010; Arrow 1972; Dearmon and Grier 2009). As such, it is a necessary component for the successful solution of social dilemmas such as pollution abatement, tax compliance, the maintenance of sound and constructive political and economic relationships, and containment of epidemics, to name a few (Daniele and Geys 2015; Min 2020;

Ostrom 2005). Identifying the determinants of generalized trust has therefore been and remains today one of the key problems in political science, as it might provide social planners and policymakers with viable instruments to achieve the desirable social outcomes. An intensely debated and yet unresolved question is, in this respect, whether institutional quality causes generalized trust. Our article takes one step further in clarifying this relationship.

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High levels of generalized trust are typically attributes of societies characterized by high institutional quality. In the Nordic countries, known for their low levels of corruption, more than 60% of the population consistently reports that most people can be trusted. The percentage drops to less than 10% in countries suffering from widespread corruption (Ortiz-Ospina and Roser 2020). The evidence for a positive correlation between institutional quality and generalized trust is strong and robust (Berggren and Jordahl 2006; Delhey and Newton 2005; Freitag and Bühlmann 2009; Knack and Keefer 1997; Knack and Zak 2003; Kumlin and Rothstein 2005; Robbins 2012a). Despite the intense and decades-long debate, however, the causal link tying the two is neither straightforward nor unequivocally established due to the numerous confounders (e.g., cross-country differences in historical, social, economic, and political conditions, among others) and to the slow-moving nature of both generalized trust and institutional quality. Moreover, while many scholars hold the view that stronger institutions are the preconditions for generalized trust to develop (e.g., Dinesen 2012; Dinesen and Hooghe 2010; Rothstein 2013; Rothstein and Eek 2009; Rothstein and Stolle 2008; Sønderskov and Dinesen 2014; Spadaro, Gangl, Van Prooijen, Van Lange, Mosso 2020), others claim that more trusting societies are better equipped to establish institutions of better quality (e.g., Bjørnskov 2010; Graeff and Svendsen 2013; Keele 2007; Lambsdorff 2002; Uslaner 2002; Wroe, Allen, and Birch 2013). Indeed, empirical investigations reveal strong feedbacks between the two (e.g., Paxton 2002; Robbins 2012b).

Although a few studies resort to experimental methods with the aim of breaking these endogeneities, the causal relationship remains elusive due to their cross-cultural nature. Rothstein and Eek (2009) find that students in Sweden and Romania who experienced corruption abroad display lower generalized trust. Dinesen and his colleagues find that generalized trust of immigrants from low-trust/high-corruption countries increases with the number of years spent in high-trust/low-corruption Denmark (Dinesen 2012; Dinesen and Hooghe 2010; Nannestad, Svendsen, Dinesen, Mannemar, Sønderskov 2014; Sønderskov and Dinesen 2014). As You (2018, 11) notes in his comprehensive review of the literature, more empirical investigations are needed to understand whether institutional quality indeed impacts generalized trust.

We take up the challenge of investigating whether impartial and trustworthy institutions can be regarded as determinants of generalized trust (following arguments of Tarrow 1996; Levi 1998; Rothstein 2000; 2011, among others). We utilize a novel experimental design that al-

lows us to manipulate institutional quality in the laboratory to isolate its effects from common cross-cultural confounders. In our design, we introduce a minimal modification in the public good game, a workhorse of extensive experimental research in behavioral science, allowing us to directly and explicitly manipulate institutional quality. We can therefore mimic the context in which the consequences of institutional quality on individual and collective welfare take place in the real world.

The standard version of the public good game stylizes the raising of funds for public good provision (e.g., public schools, roads, and green spaces). In the game, participants in groups of three all choose how much to contribute to a common good out of a personal endowment and how much to keep for themselves. Social welfare is maximized when everyone contributes maximally to the common good, although each individual's self-interest is to keep their own endowment, let others contribute, and acquire the benefits of others' contributions.

Our variant introduces an agent acting as an administrator of public money and an institutional framework which we experimentally manipulate to vary its ability to prevent corrupt behavior of the administrator. The administrator is part of the group and is mandated to collect each of the group members' contributions to the public good, including their own, and to redistribute them according to the standard public good rule—a task, which is normally automated in experimental implementations of the game. Crucially, the administrator has the opportunity to embezzle any fraction of the collected amount.¹ We experimentally vary the probability with which embezzlement attempts by the administrator are detected and prevented by the institutions: perfect institutions allow for a 0% chance of embezzlement success and perfectly ensure (public) property rights over the public budget; slightly imperfect institutions allow embezzlement attempts to succeed with a 1% chance; and imperfect institutions allow embezzlement attempts to succeed with a 50% chance.² We thus experimentally manipulate the room for engaging in corrupt behaviors left open by the institutions rather than the incidence of corruption itself, that is, institutional quality rather than the ensuing practices. In real-world settings, our treatment can relate to any set of conditions that allows for embezzlement—lack of anticorruption laws, weak enforcement of anticorruption laws, or lack of

¹We do not explicitly allow nor sanction embezzlement. However, our treatments affect the behavior of the administrators as expected; see footnote 14.

²See the online supporting information (p. 1) for more details about the standard public good game and our variant.

anticorruption norms, to name a few. Our treatment thus not only taps on the presence of anticorruption institutions and monitoring, as their mere *presence* does not necessarily guarantee successful corruption prevention (e.g., Huss 2020), but also on their *effectiveness* if they exist.

To provide evidence for a *causal* link running from institutional quality to generalized trust, we design an experimental design consisting of two phases. In the first phase, we expose the participants to exogenously varied levels of institutional quality in the context of our variant of the public good game. In this respect, we study the impact of institutional quality, that is the ability of the institutions to prevent eventual corrupt behavior, on trust, and not the impact of embezzlement per se. For this reason, we inform the participants about the probabilities with which embezzlement attempts will be detected, but we do not provide feedback on the presence, size, and success of embezzlement attempts, on whether checks on the administrator's behaviors occurred, or on individual contributions.

In the second phase, we measure trust among subjects who have experienced institutions of different quality. After the public good phase, we break up the groups and rematch group members who did *not* act as administrators from the same session in stranger pairs. Therefore, the subjects in each pair were exposed to the same level of institutional quality. One subject in each pair was randomly assigned the role of sender and the other that of receiver, as in the standard trust game by Berg, Dickhaut, and McCabe (1995).

The strategic, economic, and temporal separation between the public good and trust phases serves a twofold purpose. First, it cleans our measure of trust of strategic interdependencies carried over from the public good phase beyond institutional quality, the only influencing factor allowed to vary systematically across conditions. Second, it ensures that our measure of trust is not directly subject to the institutional environment, thus reflecting the behavioral definition of trust as individuals' willingness to make themselves vulnerable to others who face no obligation towards them, offered by Coleman (1994) and Fehr (2009). Moreover, increasing the "distance" between the two situations makes the testing grounds for our hypothesis harsher.

With this setup, we can directly observe, under hard test conditions but in a simple and parsimonious experimental design, the impact of institutional quality on trust among strangers: reciprocity between the administrators and the group members, as well as among group members themselves, is excluded. Our analysis allows us to remove expectations about other group members' coop-

erativeness, about the administrator's embezzlement attempts, and earning effects, as confounders of institutional quality in determining trust.³

Our findings document the existence of a causal effect of institutional quality on trust among strangers. We show that knowledge about the occurrence or success of corrupt behaviors does not seem to be necessary for trust to deteriorate. The mere exposure to institutional imperfections, as opportunities for corrupt behaviors to succeed, is enough to cause sharp drops in trust.⁴ This result establishes institutional design as a driver of generalized trust well beyond the specifics of agents' behaviors, reinforcing and adding new nuances to previous findings by Dickson, Gordon, and Huber (2015).

We provide external validation to our experiment by showing correlational evidence documenting a negative and strong relationship between levels of public sector embezzlement and generalized trust. In doing this, we use the latest data from some of the largest and widely used databases in social science—the World Value Survey, the European Value Survey, and the Varieties of Democracy Dataset. We supplement these findings with an individual-level analysis across European NUTS2 regions using unique data from the European Quality of Government Index, the widely used European Social Survey, and Eurostat (see the online supporting information, p. 8). The results from the analyses of this broad range of survey data are strong and robust, implying that the experimental findings are not necessarily an artifact of the experimental design but are likely to be at least in part behind the correlations observed in the surveys.

Our article proceeds as follows. We first introduce our theoretical framework, where we provide the definitions and describe the mechanisms behind the core relationships in this study. Second, we introduce the experimental design in more detail. We then present our experimental results together with the results from correlational analyses. We end by discussing the key findings and providing avenues for future research.

³We acknowledge that institutional quality includes many dimensions, with corruption (or more specifically embezzlement as an aspect of corruption) being only one of them. We nevertheless believe that reducing institutional quality to one dimension—as its ability to prevent, in our operationalization, embezzlement—is crucial for obtaining clear-cut testable predictions and a clean experimental design. Moreover, other potential intervening factors, as for instance communication, group size, and familiarity with public officials, might each have a role in shaping patterns of generalized trust. For reasons of tractability, we leave further tests of these and other factors for future research.

⁴Our design lets us conclude whether exposure to institutions of lower quality leads to lower levels of generalized trust. However, we do not investigate whether changes in institutional quality cause changes in generalized trust.

Background and Theory

Trust contributes to many desirable societal outcomes (Beugelsdijk and van Schaik 2005; Zak and Knack 2001). It fosters collective action and increases the likelihood of reaping the benefits of cooperation (Denzau and North 1994; Ostrom and Walker 2003). In a common definition, it is regarded as an individual's readiness or willingness to make him or herself vulnerable to others (Coleman 1994; Fehr 2009), where "others" can refer to both individuals or institutional third parties, such as politicians and public officials. The literature therefore typically makes a distinction between authority-bounded, or vertical, forms of trust and social, or horizontal, trust.

Conceptually, authority-related forms of trust consist of two partly overlapping components, both relating to the vertical dimension between citizens and state actors: institutional trust, referring to trust in neutral public institutions (e.g., the state bureaucracy, judiciary, and their employees) and political trust, which is associated with trust in partisan institutions (e.g., parliament, cabinet, the head of state, and political parties; see Newton, Stolle, and Zmerli 2018; Rothstein and Stolle 2008). Horizontal, or social, trust is divided instead into *particularized* trust and *generalized* trust (Yamagishi and Yamagishi 1994). As discussed by Newton and Zmerli (2011), particularized trust is typically associated with specific individuals or groups, usually personally known or ingroup members. At the opposite, generalized trust is more inclusive and concerns the degree to which people think that others can be trusted, without the need for previous personal interactions or social similarities. Generalized trust therefore extends beyond individuals who know each other and meet face-to-face: it implies trust towards strangers or anonymous others. Thereby, generalized social trust is not a virtue or asset for the individual per se but can be thought of as a genuine "collective good": it only is an asset for the individual and for society if most people are indeed trustworthy.

There are two strands of literature that have discussed the driving forces behind generalized trust: one argues that the existence of a tightly connected web of social interactions and robust social capital, in the form of networks and norms of reciprocity and trustworthiness, creates preconditions for generalized trust to develop (see, e.g., Hooghe and Stolle 2003; Putnam 1993, 2000). In this society-based approach, it is the "quality" of social interactions which gives rise to generalized trust among citizens.

Another, institutional, approach offers a parallel and not incompatible view, envisaging the state and its insti-

tutions as drivers of generalized trust (Levi 1998; Tarow 1996). Generalized trust is in this perspective fostered by impartial, uncorrupt, honest, and trustworthy (high-quality) institutions (Rothstein 2000, 2011, among others) defined as the "rules of the game in a society ... that shape human interactions" (North 1990, 3).⁵ In this article, we focus on the institutional approach to understanding generalized trust.

The institutional approach proposes three arguments in support of a causal link between institutional quality and generalized trust. First, among the tools the state can adopt to spur trust among its citizens is its legal system. Legal systems ensure reliable contracts, secure rights, and enforce rules that constrain (antisocial) behaviors by sanctioning noncompliance, protecting minorities and individuals, and supporting participation (Berggren and Jordahl 2006; Levi 1998; Robbins 2012a; Spadaro, Gangl, Van Prooijen, Van Lange, Mosso 2020). If these contracts are broken or insufficiently enforced, citizens will have low trust that the prescribed codes of behavior will be respected by others. For example, the task of agencies that support law and order is to detect and punish those who break contracts and laws and therefore cannot be trusted. If citizens do not believe that lawbreakers can be effectively pursued, they will know that breaking the law can remain unpunished. Furthermore, if citizens believe that others have the opportunity to get away with their crimes, they have few reasons to trust them not to commit any (Rothstein and Stolle 2008).

Second, institutions can influence individuals' sense of identification with the group, which operates under these same institutions (Martinangeli and Martinsson 2020; Wichardt 2008). Individuals who perceive the institutions as being fair, impartial, and honest are more likely to feel a stronger sense of group belonging and make social (group) goals one's own (Wenzel 2007). For instance, De Cremer, Tyler, and Ouden (2005) show that inclusiveness and membership feeling increase trust among group members. Similarly, Ostrom (2005, 74) demonstrates that individuals with a stronger sense of group affiliation are more likely to trust others. By increasing identification with the group, high-quality institutions are therefore likely to increase generalized trust.

⁵Scholars have argued that trust may also be found among those involved in corruption and those who profit from an unregulated social environment, such that widespread corruption is associated with higher levels of social trust. Trust that is functional in corrupt networks, however, is considered to be *particularized* rather than *generalized* trust (Uslaner 2002) and is beyond the scope of this article.

Third, institutional quality can determine generalized trust via the perceived role occupied by public officials in society (Rothstein 2013; Rothstein and Stolle 2008). In people's eyes, public officials may appear as representatives of the society. Their behavior is therefore illustrative of how society functions in general. Thus, if citizens experience or hear of certain behavior of public officials, they expect others in society to behave similarly. For instance, by experiencing or hearing about corruption among public officials, individuals might infer that if even those who are placed in the service of the public act selfishly and against public interests, then it is likely that others do too, given the chance. From this follows that if public officials cannot be trusted, others in the society should not be trusted either. Moreover, direct experience might not be the only medium for this mechanism. Indirect exposure to corrupt officials might come from media stories, rumors, collective memory or, most importantly, through the experience of one's parents and relatives during childhood, each of which can also contribute to deteriorated generalized trust (Rothstein 2000).

Despite the existence of these three, rather distinct, theoretical reasons to expect the existence of a causal link between institutional quality and generalized trust, empirical evidence remains scant and difficult to gather due to the aforementioned endogeneities and lack of data. This article enters this debate by offering experimental evidence for the existence of this causal link.⁶ We, therefore, hypothesize that:

H1: Institutions of higher quality—that are more capable of preventing corrupt behaviors of public officials—have a positive causal effect on trust among strangers.

Experimental Design and Procedures

We collected our data in the ECONLAB laboratory for experimental social sciences at the Max Planck Institute for Tax Law and Public Finance in Munich, with a sample of 264 subjects at the end of February 2020. Each participant signed an informed consent form upon admittance to the sessions. The experimental instructions are

⁶We do not investigate whether causation also runs in the opposite direction. Furthermore, we do not attempt to experimentally test the relevance of any of the above-mentioned three mechanisms suggested in previous research. These extensions of our experimental design are left for future research.

presented in the online supporting information (p. 14).⁷ The average payout was €22 and completion time was approximately 45 minutes.

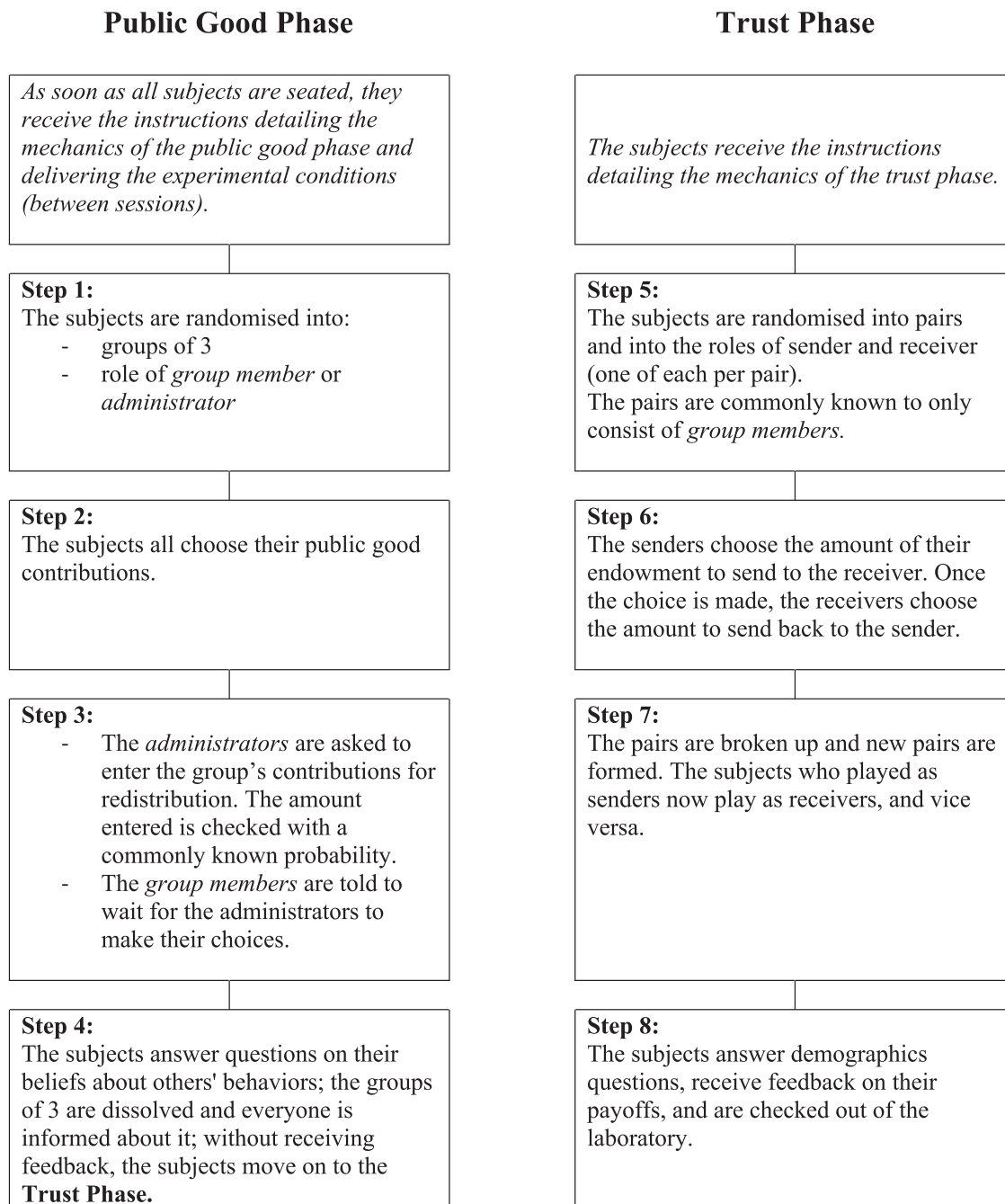
The design had two consecutive phases, each consisting of a one-shot game. Upon being seated, the participants received the instructions for the public good phase (referred to as Phase 1), which were also read out loud by a member of the laboratory's staff. Upon completion of the public good phase, the participants were handed the instructions for the trust phase (referred to as Phase 2). The instructions detailed all tasks and the earning computations nondeceptively.⁸ The participants were informed that the earnings from only one randomly selected phase would be paid out. All outcomes and earnings were communicated only at the very end of the session. Payouts were administered privately by the laboratory staff. Figure 1 offers a schematic summary of the experiment.

Public Good Phase

The first phase of our experiment consisted of a modified public good game, in which we introduced an administrator of group contributions and an institutional framework that could prevent corrupt behaviors of the administrator. The subjects were first randomized into groups of three. This group size maximizes the number of independent observations in our experiment while still allowing us to meaningfully implement our experimental design. One of the three subjects in each group was then randomly assigned the role of *administrator*, while the other two were assigned the roles of *group members*. The task of the administrator was to collect the contributions of the group, including their own, and to redistribute the total amount by entering the corresponding value in the appropriate box, an automated task in standard implementations of the game. After all subjects in the group made their contributions, the administrator was shown the total amount collected and could enter any fraction of it in the software. The entered

⁷The minimal detectable effect over standardized trust measures (administrators excluded) is $MDE = 0.47$ at $\alpha = 0.05$ and power $p = 0.8$. Sample observables and balance tables are reported in the online supporting information (p. 2).

⁸After receiving the instructions, the subjects received control questions. Should questions arise, the subjects could ask the trained research assistants. The experiment would proceed only after all subjects answered all questions correctly, which the research assistants would then publicly solve. This ensured that the subjects had a thorough understanding of the rules of the games and consequences of their actions within the games.

FIGURE 1 Flowchart of the Subjects' Progress through the Experiment

Notes: Flowchart displays the sequence of steps and tasks undertaken by the participants during the experiment. A translation of the experimental instructions is included in the Supplementary materials on p. 14.

value was then transformed according to the standard public good game payoff rule (see the mathematical description of the game in the online supporting information on p. 1) and distributed to all the members of the group, including the administrator.

Crucially, the administrator could attempt to embezzle any amount of the group's contributions by enter-

ing an amount lower than the total contributions for redistribution. The difference between the group's actual contributions and the amount entered would be kept by the administrator and would form part of their earnings. Should the administrator effectively embezzle a positive amount, the group members would each receive a return on their public good investment lower than what would

have been in the absence of embezzlement or in the presence of unsuccessful embezzlement.

The likelihood with which embezzlement would succeed was systematically varied at session level between null, extremely low, and relatively high (details below), thus modeling institutions of perfect, minimally imperfect, and severely imperfect quality respectively.

The public good game was played *only once*. We provided no feedback on individual contributions, on the administrator's choice of how much to redistribute, or on whether checks on the redistributed amount occurred. We elicited the group members' incentivized beliefs about each other's contributions and about the amount of total contributions which would be redistributed by the administrator (i.e., the group members' beliefs about the administrator's embezzlement behavior). The incentivization was the following: a non-administrator group member guessing the other non-administrator group member's contribution within a €1 margin of the true amount contributed would earn €1 extra. For deviations larger than €1, they would earn €1 divided by the size of the deviation. We used a similar incentivization for beliefs about the amount that the administrator sends for redistribution, only that the tolerance margin around the true value in this case was €5.

Experimental Conditions

We introduced exogenous variation in institutional quality by varying the probability with which embezzlement was detected and prevented. The software randomly drew a number $d \sim U(0, 99)$ where U denotes a uniform distribution of integers. A check on the amount entered by the administrator would be performed if $d \geq t$ where $t \in \{0, 1, 50\}$ according to the experimental condition (varied across sessions). In case embezzlement was attempted and prevented, the administrator was asked to revise their entry before the experiment could continue without further consequence. We aimed at eliminating the risk that our intervention would focalize the subjects' attention on antisociality and unethical behavior differently across conditions or would induce demand effects (Zizzo 2010). To this end, first, we used the same wording in all our conditions. Second, we kept our wording neutral, only informing the subjects that the administrators' entry would be checked with a given probability.

Condition Zero. In Condition Zero (96 subjects), we modeled institutions as fully capable of preventing corrupt behavior of public officials: any attempt at stealing the group's contributions faces a 0% chance of success. Here, any attempt at embezzlement by the administrator

was met with an error message (see the instructions in the online supporting information [p. 14]).

Condition One. In Condition One (96 subjects), the institutions allowed for a small chance, 1%, that an embezzlement attempt would succeed. The instructions communicated to the subjects that the amount entered for redistribution by the administrator would be checked with 99% probability.

Condition Fifty. In Condition Fifty (72 subjects), the institutions allowed for a 50% chance that an embezzlement attempt would succeed. The instructions communicated to the subjects that the amount entered for redistribution by the administrator would be checked with a 50% probability.

The experimental conditions are ideal models of institutional quality, without necessarily being direct equivalents of one or another real-world institutional environment. However, the variation in these ideal models, in our case corresponding to 0%, 1%, and 50%, helps us trigger psychological and social effects of relatively higher and lower institutional quality, as they appear in the real world. Therefore, comparison of our treatment effects yields results that can be related to the real-world settings. Moreover, the distinction between 0% and 1% conditions serves a distinct purpose. From a cognitive point of view, moving from a perfect 0%-type institution to a minimally and virtually inconsequentially imperfect 1%-type institution might produce a discontinuous difference in behavior compared to, for example, moving from 1% to 2%. In both cases, there is a 1% increase in the probability that embezzlement will succeed, but in the first case we move from a perfect to an imperfect institution, while in the second case we do not. Distinguishing between 0% and 1% is therefore substantially more informative.

Trust Phase

In the second phase, we elicited a behavioral measure of trust among the subjects using a standard *one-shot* trust game (Berg, Dickhaut, and McCabe 1995). We matched the subjects in pairs consisting of a sender and a receiver, and each received a new endowment of €6. The senders chose to send any integer amount of their endowment to the receivers and keep the rest. The receivers received the doubled amount and could then choose to send any integer amount of their endowment plus what they had received back to the senders. As receivers maximize their

payoff by sending back nothing, it is a dominant strategy for the senders to keep everything for themselves. The amount of their endowment sent by the sender can be interpreted as a measure of their willingness to trust the receiver.

As we are interested in the impact of the institutional quality experienced in the public good game phase on individuals' willingness to trust others, we study the trusting behavior of the *group members*, not administrators.⁹ For this reason, group members played the trust game only with other group members (not administrators) and were informed about it. Moreover, we made the subjects aware that the groups dissolved after the end of the public good phase, and that for the trust game they would be randomly rematched with other group members from the session. We can thus rule out any impact of reciprocal behaviors across phases on the choices in the trust game. By breaking up the public good group and organizing subjects in new pairs, we decoupled what actually happened in the public good phase from the trust phase and are able to isolate the impact of exposure to institutions of different quality on trust. All subjects played both as senders and receivers, in random order and with different partners, and were informed that only one of the two rounds, randomly selected, would be valid as trust-phase earnings. Moreover, we kept feedback minimal, only communicating to the receivers the amount available to be transferred back to the sender.

After completion of the trust game, the subjects answered a number of sociodemographic questions, were debriefed about their payoffs, including which of the two phases would be paid out, received their payment in private, and left. Figure 1 summarizes the flow of the experiment.

Results

Our results show that exogenous variation in institutional quality in the first phase of our experiment causally determines trust among strangers in the second phase. Crucially, we highlight that knowledge of current or previous misconduct by the administrator is not needed to elicit such response: the existence of a mere opportunity for misconduct due to the institutions' inability to prevent it is enough.

Table 1 displays the results from an OLS regression of the amounts sent by the group members (non-

administrators) when participating as senders in the trust phase of the experiment. Amounts sent back are analyzed separately. All regressions control for the order in which the subject participated in the trust game (sender first or otherwise), the subject's gender, age, and occupation.¹⁰ We show below that our results are robust to the inclusion of individuals' (potentially endogenous) beliefs about the amount the administrator sends for redistribution divided by total group contributions (normalized beliefs: Belief(e)), beliefs about the other group member's contribution (Belief(c)), own contribution, and of total group contributions. The stability of our estimates to these controls reassures us that our treatment effects are not mediated by biases induced by variable omission or by post-treatment controls (see Montgomery, Nyhan, and Torres 2018). Corresponding Tobit regressions reported in the online supporting information (p. 3) confirm the results in Table 1.

Trusting behavior is highly sensitive to the experimental conditions: in presence of a 50% probability of successful embezzlement attempts, the amount sent in the trust phase decreases on average by almost €1.2. The size of the decrease corresponds to 20% of the subjects' initial endowment. The significance of these estimates lies well below the 0.05 threshold in models 1 to 3. Therefore, amounts sent in the trust game drop significantly when embezzlement attempts in the public good phase have a relatively large chance of succeeding. The amounts sent in Condition One, where only 1% of the administrators' attempts at embezzlement could succeed, are not significantly different from the baseline Condition Zero, where 0% of embezzlement attempts could succeed. This finding suggests that people might not react to the presence of imperfections in institutions if they are very small.¹¹

These results support the hypothesis that trust among strangers will be lower among individuals exposed to institutions that are incapable of perfectly harnessing corrupt behavior of public officials, compared to trust among individuals exposed to institutions

¹⁰A two-sided Kruskal–Wallis test cannot reject the null of equality in the amounts sent between subjects who participated as senders first and receivers later or vice versa; $p = .622$.

¹¹We note that Condition One had a minor difference in wording in the first sentence compared to the other conditions, which was introduced to emphasize that the probability of embezzlement succeeding was small. We cannot exclude that the lack of effect on this condition might stem from this difference, which might have curbed a potentially larger effect. The wording of the following two sentences, identical in all conditions, was however purposefully used to communicate the factual probabilities from both viewpoints of checks happening and not happening, thus limiting the scope for wording effects.

⁹Interaction in the trust phase is *not* regulated by any institution and is not subject to the institution regulating the public good phase. The experimental design of the trust phase is identical across conditions.

TABLE 1 The Effect of Embezzlement on Generalized Trust

	Trust Game: Amount Sent by the Group Members				
	Model 1	Model 2	Model 3	Model 4	Model 5
Condition One	−0.590 (0.434)	−0.594 (0.416)	−0.618 (0.418)	−0.606 (0.419)	−0.794 (0.405)
Condition Fifty	−1.271* (0.434)	−1.181* (0.432)	−1.195* (0.430)	−1.163* (0.433)	−1.029* (0.442)
Own contribution		0.109* (0.027)	0.087* (0.033)	0.094* (0.038)	0.090* (0.037)
Group contributions			0.026 (0.023)	0.015 (0.032)	0.029 (0.031)
Belief(c)				0.028 (0.050)	0.034 (0.048)
Belief(e)					1.247 (0.657)
Sender first	−0.253 (0.356)	−0.327 (0.344)	−0.358 (0.344)	−0.339 (0.344)	−0.203 (0.337)
Constant	3.665* (0.659)	3.346* (0.621)	2.963* (0.754)	2.915* (0.748)	1.718* (0.814)
Individual controls	Yes	Yes	Yes	Yes	Yes
Observations	176	176	176	176	174
R-squared	0.069	0.137	0.144	0.146	0.187

Notes: OLS regression of amounts sent in the trust phase. The analysis excludes the administrators. We control for the order in which the subject participated in the trust game as sender and receiver (Sender first), age, gender, and occupation. The variable Belief(e) measures normalized beliefs about the amount redistributed by the administrator normalized against the group’s total contributions, while Belief(c) measures beliefs about the other group members’ contributions. Two observations in Model 5 are dropped, as there was one group with zero contributions, where normalized beliefs could not be computed. Condition Zero is baseline. Robust standard errors in parentheses; * $p < .05$.

which instead do so perfectly. One might ask whether the reduced willingness to trust others observed after exposure to imperfect institutions is driven by differences in expected earnings from the public good phase across conditions. We introduced several precautions to avoid this confounder. First, the wording we used in our conditions excludes the possibility that there are differences in the participants’ focus on unethical behavior across conditions (e.g., the amount entered by the administrator is “checked” by the software in all conditions though with different probabilities). Second, earning expectations could be driven either by expected total group contributions and/or by expected embezzlement. We chose to fix beliefs about the group’s cooperativeness by explicitly revealing total group contributions when eliciting beliefs about embezzlement (recall that

the subjects were unaware of whether embezzlement attempts occurred or succeeded). We also controlled for beliefs about embezzlement in our regressions in Table 1. The information on group cooperativeness provides the subject with a meaningful monetary space against which to form their beliefs and allows us to standardize their beliefs to ensure comparability across groups that exhibit different cooperation levels.

Group cooperativeness is not influenced by our interventions. Tables 2 and 3 report average group contributions, including and excluding the administrators, respectively, and the p -values from Kruskal–Wallis tests of equality across conditions. These tests do not allow us to reject the null hypothesis of equality across conditions both including and excluding the administrators’ contributions: $p = .714$ and $p = .731$, respectively. Group

TABLE 2 Average Group Contributions in Each Condition

Condition	Group Contributions	Standard Deviation	Kruskal–Wallis
Zero	19.250	8.167	
One	20.781	11.198	0.714
Fifty	19.583	9.150	

Notes: Average group contributions collected in each condition and standard deviations. The last column displays the p -value from a two-sided Kruskal–Wallis (KW) test of equality across conditions.

cooperativeness therefore cannot explain the variation in trusting behaviors, as also evident from Table 1.¹² Beliefs about embezzlement do not explain our experimental effects either. The models in Table 1 control for beliefs about embezzlement and about other group members' contributions. The impact of institutional quality remains stable, strong, and significant, beyond any efficiency or expected earnings concerns.¹³ Notice that we do not find any significant effect of our conditions on trustworthiness (proportions sent back in the trust phase), with a Kruskal–Wallis test rejecting the null of equality across conditions (KW $p = .774$). This finding confirms that earning expectations do not explain our results. Our experimental conditions however “worked”: the administrators' embezzlement behavior was influenced as expected.¹⁴

Supporting Survey Evidence

We are also interested in whether our experiment and its findings indeed capture what happens in the world outside of the laboratory. In what follows, by using the

¹²Regression analyses of contributions are reported in the online supporting information (p. 4).

¹³Beliefs might be endogenous to the experimental conditions. As the analyses in the online supporting information (p. 5) demonstrate, beliefs about embezzlement attempts *decrease* with institutional quality. Beliefs about others' contributions do not vary with the experimental conditions.

¹⁴Higher-quality institutions, being more effective at preventing the success of embezzlement attempts, prompted fewer attempts. In Condition Zero, there were no embezzlement attempts although attempts were in principle possible. In Condition One, four out of 31 administrators attempted to embezzle, with 12% of the group's resources on average embezzled in this condition, regardless of embezzlement success. In Condition Fifty, 11 out of 24 administrators made embezzlement attempts, such that the average embezzlement rate regardless of embezzlement success is 30% in this condition. Kruskal–Wallis tests reject the null hypothesis of equality of embezzlement behaviors across conditions (KW $p = .015$).

TABLE 3 Average Group Member Contributions in Each Condition (excluding administrators)

Condition	Group Member Contributions	Standard Deviation	Kruskal–Wallis p -Value
Zero	12.969	7.601	
One	13.656	9.737	0.731
Fifty	11.667	8.432	

Notes: Average group member contributions (i.e., administrators excluded) collected in each condition and standard deviations. The last column displays the p -value from a two-sided Kruskal–Wallis (KW) test of equality across conditions.

most recent waves of widely used publicly available survey data, we show that a negative association between administrative embezzlement and generalized trust can also be observed across countries. This result substantiates and offers insights into real-world regularities against which to interpret our experimental findings.

We measure the level of generalized trust using individual responses to the question “Generally speaking, would you say that most people can be trusted or that you need to be very careful in dealing with people?” from all waves of the World Value Survey (WVS) (Haerpfer, Inglehart, Moreno, Welzel, Kizilova, Diez-Medrano, Lagos, Norris, Ponarin and Puranen 2021) and European Value Survey (EVS 2021), merged as suggested by the Integrated Value Survey. The indicator is binary, where 1 stands for “most people can be trusted.”

To remain consistent with our experimental investigation, we operationalize institutional quality as the prevalence of embezzlement, and we report analyses using broader definitions of institutional quality in the online supporting information (p.10). We use embezzlement indicators recently compiled by the Varieties of Democracy (V-Dem) Institute (Coppedge, Gerring, Knutsen, Lindberg, Teorell, Alizada, Altman, Bernhard, Cornell, Fish, Gastaldi, Gjerløw, Glynn, Hicken, Hindle, Ilchenko, Krusell, Lührmann, Maerz, Marquardt, McMann, Mechkova, Medzihorsky, Paxton, Pemstein, Pernes, von Römer, Seim, Sigman, Skaaning, Staton, Sundström, Tzelgov, Wang, Wig, Wilson, and Ziblatt 2021; Pemstein, Marquardt, Tzelgov, Wang, Medzihorsky, Krusell, Miri, and von Römer 2021), consisting of expert answers to the question: “How often do public sector employees steal, embezzle, or misappropriate public funds or other state resources for personal or family use?” (Coppedge, Gerring, Knutsen, Lindberg, Teorell, Altman, Bernhard, Cornell, Fish, Gastaldi, Gjerløw, Glynn, Hicken, Lührmann, Maerz, Marquardt,

McMann, Mechkova, Paxton, Pemstein, Römer, Seim, Sigman, Skaaning, Staton, Sundström, Tzelgov, Uberti, Wang, Wig, and Ziblatt 2021). We reverse the indicator, so that higher values mean larger extent of embezzlement. We perform a multilevel probit regression using data from the latest year when the measure of trust is available. The list of country-years used in the analysis is included in the online supporting information (p. 7).

On the country level, we control for the natural logarithm of gross domestic product (GDP) per capita from the World Development Indicators (2020), as it is believed to correlate with generalized trust (Knack and Keefer 1997), natural logarithm of the population size (World Bank 2020), as larger countries tend to be more diverse in terms of ethnicity and culture which might make them less trusting (Bjørnskov 2007), the level of inequality measured by GINI index (World Bank 2020), as inequalities impede trust (Barone and Moccetti 2016), and homicide rates (World Health Organization 2020), as people living in areas characterized by high levels of crime rates tend to trust each other less (Rosenfeld, Baumer, and Messner 2001). All measures are taken from the Quality of Government dataset (Teorell, Sundström, Holmberg, Rothstein, Alvarado Pachon, and Mert Dalli 2021). Further, we control for ethnic fragmentation, measured by the number of politically relevant groups in a country (Vogt, Bormann, Rügger, Cederman, Hunziker, and Girardin 2015, aggregated in country-year format by Girardin, Hunziker, Cederman, Bormann, Rügger, and Vogt 2015), as divided societies tend to be less trusting (Bjørnskov 2008), and the level of democracy measured by the Electoral Democracy Index from V-Dem (Coppedge, Gerring, Knutsen, Lindberg, Teorell, Alizada, Altman, Bernhard, Cornell, Fish, Gastaldi, Gjerløw, Glynn, Hicken, Hindle, Ilchenko, Krusell, Lührmann, Maerz, Marquardt, McMann, Mechkova, Medzihorsky, Paxton, Pemstein, Pernes, von Römer, Seim, Sigman, Skaaning, Staton, Sundström, Tzelgov, Wang, Wig, Wilson and Ziblatt 2021), as democracy has been found to affect generalized trust (Ljunge 2014). Moreover, we control for the degree of civil society participation, measured by the civil-society-organizations participatory environment indicator, capturing how many civil society organizations exist and how widely the public participates in them, also from V-Dem, as civil society has been argued to be a driver of generalized trust (Putnam 2000). The variables are taken for the latest year available before the latest survey on generalized trust.

On the individual level, we control for age, gender, education, subjective income level (low, medium, high), and participation in voluntary associations, such

as sports, religious, environmental, and other organizations (see WVS/EVS codebooks for the full list), where 1 refers to active membership and 0 refers to no membership. In addition, we control for individual exposure to crime using the question “In the last 12 months, how often have you or your family felt unsafe from crime in your home?” in a separate model, due to data availability. The measure is inverted, so that higher values correspond to higher exposure. Summary statistics for all variables are included in the online supporting information (p. 6).

Table 4 presents the results. The regressions show that the relationship between the level of public sector embezzlement and generalized trust is negative and significant: in countries with a greater incidence of public-sector embezzlement, people trust others less. *P*-values are well below the 0.05 threshold in all model specifications. We can conclude that generalized trust is negatively associated with administrative embezzlement across countries. Intraclass correlation coefficient varies between 0.13 in Model 1 and 0.11 in Model 4, implying that most of the variation in trust comes from within countries, between the individuals. This justifies the multilevel analysis with individual-level controls.

The online supporting information (p. 8) presents further evidence for a positive and strong association between institutional quality, more broadly, and generalized trust across European regions, based on the unique and recently collected data from the European Quality of Government Survey (Charron, Lapuente, and Annoni 2019).

The findings from the survey analysis supplement our experimental evidence. The fact that we see a correlation in the survey data strengthens arguments for the existence of the causal link we observe in the experiment. Conversely, the existence of a causal link in the experiment strengthens the arguments for an unobservable causal link producing the correlation in the survey analysis. The correlational and the experimental evidence together thus yield complementary insight into the institutional quality-trust nexus.

Discussion

This article expands our understanding of the relationship between generalized trust and the institutions that shape human interactions in a society. We address a so far unresolved question in the empirical social-scientific research: does institutional quality influence trust among strangers? Despite decades of accumulated evidence of a

TABLE 4 The Relationship between the Level of Embezzlement and Generalized Trust across Countries

	Model 1	Model 2	Model 3	Model 4
Public sector embezzlement	-0.186* (0.050)	-0.201* (0.053)	-0.177* (0.054)	-0.164* (0.061)
Country level controls:				
GDP per capita (ln)	0.164* (0.040)	0.164* (0.041)	0.154* (0.042)	0.100* (0.044)
Electoral democracy index	-0.833* (0.291)	-1.036* (0.299)	-0.938* (0.303)	-0.824* (0.310)
CSO participatory environment	0.039 (0.056)	0.056 (0.054)	0.033 (0.054)	-0.002 (0.054)
Population (ln)	0.059* (0.026)	0.061* (0.027)	0.066* (0.028)	0.131* (0.033)
GINI index (WB.est.)		-0.020* (0.009)	-0.019* (0.008)	-0.010 (0.010)
Individual level controls:				
Education level (middle)			0.041 (0.022)	-0.020 (0.028)
Education level (upper)			0.258* (0.039)	0.128* (0.047)
Income (medium)			0.070* (0.020)	0.071* (0.031)
Income (high)			0.217* (0.034)	0.195* (0.076)
Memberships in vol.org			0.191* (0.021)	0.178* (0.032)
Exposure to crime (rarely)				-0.083* (0.031)
Exposure to crime (sometimes)				-0.052 (0.045)
Exposure to crime (often)				-0.029 (0.059)
Constant	-1.855* (0.609)	-1.070 (0.788)	-1.448 (0.753)	-2.585* (0.872)
Additional country controls	Yes	Yes	Yes	Yes
Additional individual controls	Yes	Yes	Yes	Yes
Observations	165,115	156,374	139,392	81,317
Number of countries	104	98	96	54

Notes: Multilevel probit regression of generalized trust on public sector embezzlement. Additional country controls include the ln number of politically active groups and homicide rates. Additional individual controls include age and gender. Baseline level for Education is low. Baseline level for income is low. Baseline level for Exposure to crime is never. Robust clustered standard errors in parentheses, * $p < .05$.

strong and positive correlation between the two, the existence of a causal link has not yet been established. We adopted a simple experimental design, allowing us to exogenously manipulate the subjects' exposure to institutions of different quality before eliciting their willingness to trust others. To our knowledge, this article is the first to report the impact of exposure to different levels of institutional quality on trust among strangers in a setting eliminating the social, economic, political, and historical confounders that plague cross-cultural research with survey data.

The results from our experiment lend credibility to the claim that high-quality institutions are among the preconditions for a trusting society, or conversely, that low-quality institutions yield lower levels of trust in others. Crucially, we show that individuals' direct experience with or knowledge of corrupt or otherwise untrustworthy behaviors of public officials or administrators is not needed to elicit such effect. The existence of faults in the institutional design, creating opportunities for corrupt practices to succeed, leads to substantially lower trust. These findings are consequential: a trusting social fabric is better equipped to develop the full potential of social-economic interactions (Arrow 1972) and to provide public goods and coordinated collective action that benefit society as a whole. For instance, managing common-pool resources, paying into social welfare systems, or containing the adverse consequences of natural disasters, such as pandemics, all require individuals to trust that others will not free ride (Daniele and Geys 2015; Min 2020; Ostrom 2005). Generalized trust can moreover be a viable substitute to costly monitoring in the presence of incomplete or hardly enforceable contracts (Fukuyama 1995; La Porta, Lopez-De-Silanes, Shleifer, and Vishny 1997).

An institutional framework, as opposed to generalized trust itself, can be directly manipulated and its quality can be, at least to some extent, improved by design. Our results suggest that social planners aiming at fostering generalized trust can, by virtue of the causal relationship uncovered here, count on institutional design among the tools at their disposal. Setting up institutions that provide individuals with the necessary assurance that socially harmful behavior will be effectively harnessed might be an open avenue towards achieving a more trusting social fabric.

Good quality institutions might be very hard to put in place. In light of the stark effect that doubts about the effectiveness of the institutions have on trust, a facilitating tool available to policymakers might be communication. Transparently and nondeceptively disseminating information about the pursuit of institutions that prevent corrupt behavior, about the steps taken towards that goal

and their successes, without substituting the strife for institutional quality itself, might prove an effective kick-off strategy to engender the virtuous circle likely tying institutions and generalized trust together (Paxton 2002; for instance, Robbins 2012b).¹⁵ Besides their policy bearing, information and communication about institutional quality beyond its practical design constitute, moreover, a promising avenue for future research.

While we observe an effect of institutional quality on generalized trust, we do not observe a corresponding effect on cooperative behaviors or beliefs about those of others. This finding is striking as it might reveal how institutional quality interacts with social norms in different behavioral domains. Crucially, while norms of cooperation do exist in a society, such that mutually cooperative behaviors are prescribed and encouraged, no corresponding norm for trusting behaviors exists (if anything, trust in anonymous others is discouraged). Hence, while cooperative behaviors prescribed by norms might survive when the individual is confronted with imperfect institutions, at least until the evidence on the lack of cooperation from others becomes visible, trusting behavior might break down more easily.

Our findings suggest further avenues to deepen our understanding of the institutions-generalized trust nexus. First, a natural step ahead is to disentangle which components of trusting behavior are behind the causal effects reported here: risk preferences, social preferences, or expected trustworthiness (Fehr 2009). Such an exercise would illuminate the channels underlying the impact of institutional quality and outline its sphere(s) of influence on the life and psychology of individuals and society. This point becomes especially important given that we uncover no effect of institutional quality on observed trustworthiness. The absence of an effect on trustworthiness, together with the fact that the same individuals played both roles of sender and receiver, suggests that the effect we uncover is more likely due to shifts in perceived social risk, both in terms of tolerated risk and/or beliefs about the incidence of untrustworthy behavior, rather than due to shifts in social preferences. The investigation of these mechanisms, however, warrants a separate study with a specifically tailored experimental setup, and we hence leave it for future research. The same applies to the task of more precisely determining the threshold beyond which the effect of embezzlement success on trust becomes significant: is it 2%, 5%, or even much closer to the 50%-level that we identify here?

¹⁵Beyond finding evidence for a causal effect of institutional quality on trust, our design in fact neither confirms nor disconfirms the existence of a causal link running in the opposite direction.

Moreover, unwarranted mistrust might prove a threat to social cohesion and lead to wasteful protective practices. Information dissemination about others' trustworthiness might prove effective in counteracting the negative impact of poor institutional quality and yet another way of enabling the virtuous circle mentioned above. Another relevant question is where the beliefs that administrators engage in less corrupt behaviors in the presence of stronger institutions stem from. One source of such beliefs could be a perception that the institutions themselves render such behaviors (nearly) pointless, as the findings by Olken (2007) suggest. A second source is a perception that the administrators are more ethical per se. The latter perspective envisages the institutions as creators of a common understanding regarding which practices are considered acceptable by most and to which most are expected to adhere.

Finally, it is also worth commenting on how our survey results relate to Putnam's (2000) theory of civil society activity as a source of generalized trust among people. We do find that individuals who participate in civil society organizations tend to have higher levels of generalized trust, which is in line with Putnam's expectations. Simultaneously, however, when looking at the results at aggregated country level, countries with higher levels of civil society participation, measured with an expert evaluation of how many civil society organizations exist and how wide public participation is in them, on average do not demonstrate higher levels of generalized trust. This finding goes against Putnam's hypothesis. These dividing results hint to the fact that institutional quality could be a more important driver for generating generalized trust in larger-scale settings, signaling that future research should also investigate why the individual-level effects do not seem to scale up.

Our article contributes with a new experimental design allowing to directly model institutional quality in laboratory settings, with clear and direct impacts on individual and group outcomes. This design allows to test key hypotheses about causal effects of the institutional context and its design on social behaviors which are usually difficult to test using non-experimental data. Potential avenues for the expansion and application of this design involve not only its application to different institutions, other than control of unethical behavior by public officials, but to tests of other theories such as society-centered theories of trust and institution formation. We invite researchers to adopt and to expand on our design to test their hypotheses.

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Supporting Information

Additional supporting information may be found online in the Supporting Information section at the end of the article.

Appendix A: The public good game

Appendix B: Sample

Appendix C: Tobit regressions

Appendix D: Public good contributions

Appendix E: Analysis of beliefs about embezzlement and others' contributions

Appendix F: Sample in the survey data analysis

Appendix G: Institutional quality and generalised trust across European regions

Appendix H: Summary indices of perceived and experienced corruption

Appendix I: Experimental instructions