They know each other, but do they trust each other? Social capital and selected beneficiaries of community-based development projects: A lab-in-the-field in rural Zimbabwe

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Research paper

They know each other, but do they trust each other? Social capital and selected beneficiaries of community-based development projects: A lab-in-the-field in rural Zimbabwe

Amandine Belard [a,*], Stefano Farolfi [a,b], Damien Jourdain [a,b,c], Mark Manyanga [d], Tarisayi Pedzisa [d], Marc Willinger [e]

[a] G-EAU, Univ Montpellier, AgroParisTech, BRGM, CIRAD, INRAE, IRD, Institut Agro, Montpellier, France
[b] Department of Agricultural Economics, Extension and Rural Development, University of Pretoria, Pretoria, South Africa
[c] CIRAD, UMR G-EAU, Hatfield 0028, South Africa
[d] Department of Agricultural Business Development and Economics, University of Zimbabwe, Zimbabwe
[e] CEE-M, Univ Montpellier, CNRS, INRAE, Institut Agro, Montpellier, France

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ABSTRACT

Community-based development (CBD) projects have long emphasized a bottom-up approach. For CBD initiatives to succeed, communities must harness their social capital, organize themselves, and actively engage in development processes. While CBD proponents highlight the promotion of social capital through community-based projects, critics argue that their effectiveness relies on pre-existing levels of trust, trustworthiness, and community interactions. To contribute to this debate, we investigate the selection bias regarding social capital induced by the recruitment strategy of an NGO in Zimbabwe. We look at differences between selected beneficiaries and non-beneficiaries in terms of pro-social behaviors, measured by incentivized games, and in terms of social networks. We also use this information to test whether being part of the same networks translates into increased trust, altruistic behaviors, and willingness to participate in collective action. Our study, conducted in 2022 in the rural district of Murehwa, Zimbabwe, comprised a survey and lab-in-the-field experiments (trust game, public good game, dictator game) involving 341 subjects. Findings showed that selected beneficiaries exhibit higher network density than non-beneficiaries. However, except for a partial experimental measure of trustworthiness, we observed no significant differences in prosocial behavior between the two groups before project implementation. The results suggest that although selected beneficiaries are more socially connected, they do not exhibit higher prosocial behaviors. These findings shed light on the common selection process used by development agencies and the inherent bias they introduce. To address this bias, development agencies should reconsider recruitment strategies that prioritize existing social ties, as they may unintentionally exclude less-connected community members. Instead, they should explore alternative selection approaches, such as the use of field data to ensure inclusiveness. Additionally, integrating trust-building activities at the beginning of projects could enhance cooperation among participants.

1. Introduction

Community-based development (CBD) projects have been integral to development assistance for several decades. They are used by governments, NGOs, and international organizations. CBD is a bottom-up and participatory approach that prioritizes the involvement of beneficiaries in the design and implementation of development projects. CBD projects have been carried out across various sectors, such as healthcare (Story et al., 2020), finance (Banerjee, 2013; Ban et al., 2020; Zambrano et al., 2023), and resource management (Mansuri and Rao, 2004; Bocci and Mishra, 2021).

CBD projects require that (Fig. 1) communities organize themselves and actively participate in the development process (Mansuri and Rao, 2004). Community members must share information and pool resources to ensure the success of CBD projects. In other words, communities targeted by CBD projects must leverage their social capital (Cameron

* Corresponding author at: CIRAD, 6 Lanark Road, Belgravia, Harare, Zimbabwe.
E-mail address: amandine.belard1@gmail.com (A. Belard).

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et al., 2015; Peralta and Shupp, 2017; Heß et al., 2021). It is widely acknowledged that communities with high levels of social capital are better equipped to engage in collective action (Mansuri and Rao, 2004; Chase and Christensen, 2010; Barr et al., 2015; Casey, 2018).

Social capital is defined as "the connections among individuals – the social networks and the norms of reciprocity and trustworthiness that arise from them" (Putnam, 2000). This definition has widely been used in the applied economics literature (Avdeenko and Gilligan, 2015; Ban et al., 2020; Murphy, 2023). While many definitions of social capital exist, most incorporate key elements like trust, reciprocity, networks, and collective action (Sawada et al., 2022).

The relationship between community-based development and social capital is complex. While proponents emphasize the role of CBD projects in promoting the formation of social capital, critics argue that the effectiveness of CBD initiatives depends on pre-existing levels of trust, trustworthiness, and community interactions (Adhikari and Goldey, 2010; Chase and Christensen, 2010; Peralta and Shupp, 2017; Casey, 2018; Marshall et al., 2023). The implementation of CBD projects is facilitated in settings where some levels of trust and a willingness for collective action already exist. For instance, introducing savings groups or common pool resource management associations in fragmented communities might prove to be challenging (Ostrom, 2010; Barnes-Mauthe et al., 2013). It has been hypothesized that development agencies have a natural propensity to select beneficiaries for development projects from communities with higher levels of social capital (Chase and Christensen, 2010; Casey, 2018; Aprilia et al., 2023; Putri Maslia et al., 2024).

Moreover, in rural contexts, where information about the local communities is lacking, development agencies need to rely on existing social networks to select beneficiaries (Basurto et al., 2020; Roy, 2022). Thus, a common strategy is to work with existing groups or ask communities to form groups with whom the agency can work, potentially resulting in the selection of individuals well included in the community's social fabric. This strategy could result in the exclusion of the ones less socially connected. The lack of available information, combined with the desire to optimize project outcomes, leads to a beneficiary recruitment strategy with social capital at its core.

Research on CBD and social capital mainly focuses on the impact of CBD projects on social capital using ex-post analysis. Results are mixed and suggest that CBD may not be as effective as expected at expanding networks and increasing prosociality among communities (e.g., Attanasio et al., 2015; e.g., Avdeenko and Gilligan, 2015; Fearon et al., 2015; Nguyen and Rieger, 2017). There is a notable gap in the literature, as no study, to our knowledge, focuses on individuals' social capital levels *before* project implementation and how relying on social capital may result a selection bias. Apprehending the selection bias of CBD beneficiaries is crucial for two reasons: first, it provides insights into who participates in CBD projects, and second, it is the first step towards disentangling the relationship between CBD projects and social capital.

Thus, the first objective of this paper is to check whether the selection bias exists in development project beneficiary recruitment, not only to measure the impact of these projects accurately (Van Rijn et al., 2012) but also to question the development agencies' recruitment strategies and their potential lack of inclusiveness.

To match this objective, we tested differences between selected beneficiaries and non-beneficiaries in terms of social and economic networks and prosocial behaviors. We define selected beneficiaries as those the development agency has identified as part of a project but have not yet been involved in project activities. Conversely, we define non-beneficiaries as those the development agency has not identified as part of the project.[1]

Given that the only naked-eye observable dimension of social capital is the structural one,[2] we infer that development agencies assume a positive relationship between this dimension and prosocial attitudes,[3] i.e., cognitive social capital, which is the real target of their efforts to improve project outcomes. This means that, per design, selected beneficiaries should exhibit higher levels of trust, reciprocity, and cooperativeness. This is in line with the assumption that social ties play a pivotal role in nurturing pro-social preferences (Avdeenko and Gilligan, 2015; Claridge, 2018).

The second objective of this study is to examine the relationship between structural and cognitive social capital. To our knowledge, only Avdeenko and Gilligan (2015) looked at the correlation between network density and experimental measures of prosocial behaviors. They found a positive correlation between prosocial behavior and a high density of family and friends networks. However, they precise that the correlations must be interpreted cautiously as both are post-treatment measures and thus might suffer from potential confounding (a limit we remove as we collect data before project implementation). It is also of methodological interest to investigate whether simpler, declarative measures of structural social capital can serve as reliable proxies for measuring cognitive, social capital.

To quantify prosocial behaviors, we implemented experimental tasks, including the dictator game (Forsythe et al., 1994), the trust game (Berg et al., 1995), and the voluntary contribution to a public good game (Isaac et al., 1994), in line with the methodology used by Karlan (2007); Avdeenko and Gilligan (2015); Ban et al. (2020). Incentivized games help eliminate social desirability and hypothetical bias by capturing revealed preferences (Avdeenko and Gilligan, 2015). These games are incentivized with money; hence, participants are more likely to behave as they would in real-life situations, as providing answers that do not align with their true beliefs would result in a loss of utility (Croson, 2002).

Additionally, we used network matrices to assess the number of socio-economic connections between participants in each laboratory session, both in the selected and control groups, consistent with the methodologies outlined in Avdeenko and Gilligan (2015) and Ban et al. (2020). Further, we included survey questions developed by Grootaert (2004) that measure social capital. Finally, we conducted a survey to capture the socio-demographic characteristics of the participants, as advised by Chuang and Schechter (2015). We organized 20 experimental sessions, evenly split between 10 selected and 10 control sessions. The final sample is composed of 341 observations.

We conducted our lab-in-the-field and surveys in Zimbabwe in October 2022. Zimbabwe's rural population primarily relies on subsistence farming and has limited resources. Smallholder farmers in rural Zimbabwe have limited access to formal credit market, which prevents smallholder farmers from diversifying their income-generating activities. In response, non-governemental organisations (NGO) have been promoting the formation of savings groups to help farmers pool resources and access informal credit. For this study, we partnered with a local NGO that promotes Village Savings and Loans Associations (VSLAs) in rural areas of Zimbabwe. At the time of our study, this NGO

[1] In the following sections, we use the terms 'selected individuals' and 'control individuals' to mirror the terminology of ex-post impact evaluation (treated and control individuals).

[2] The structural components of social capital include factors such as the number of group memberships and the density of individuals' networks. The cognitive components, on the other hand, encompass pro-social behaviors like altruism, trust, trustworthiness, and cooperativeness(e.g. Grootaert & Van Bastelaer, 2002; Krishna & Uphoff, 2002; Murphy, 2023; Putnam, 2000; Sawada et al., 2022). The background section provides detailed explanations for the terms used in this paper for the different components of social capital.

[3] This assumption is not limited to development agencies as in research it is also often suggested and rarely verified that having a denser social network contributes to an increased level of trust among its members, thereby fostering a heightened propensity for mutual assistance and altruistic actions (O'Malley et al., 2012; Avdeenko and Gilligan, 2015; Nguyen and Rieger, 2017; Casey, 2018; Ban et al., 2020; McAvoy et al., 2020; Su et al., 2022).

planned to expand its VSLA project, which started in 2021, to include more beneficiaries. This expansion provided an opportunity to examine the social capital of beneficiaries before they engaged in any project activities, ensuring a clear identification of the pre-existing social capital situtations. This context was essential in determining the study area, as it enabled us to investigate how social connections influence access to CBD projects.

Our results show that selected beneficiaries displayed a significantly higher degree of social connections with one another than non-beneficiaries. Given the NGO's selection design, this outcome was expected, considering that the NGO's directive encourages individuals to create groups with those with whom they are already socially acquainted. Furthermore, it is noteworthy that selected beneficiaries are members of more existing groups than non-beneficiaries, including farmer's groups and producers' groups. These findings highlight a key contribution of our study: the evidence of selection bias in terms of structural social capital induced by the recruitment strategy used by development agencies for CDB projects.

In contrast, we also found no substantial disparities regarding cognitive social capital between selected beneficiaries and non-beneficiaries. Except for the experimental measures of reciprocity or the stated measure of trust in family members, no significant difference was found for either incentivized or self-reported measures of prosociality. In particular, selected beneficiaries do not appear to exhibit higher levels of trust in each other. Moreover, our findings suggest weak to no correlations between structural and cognitive social capital measures. This result leads to our second contribution, which is twofold. First, it challenges development agencies' assumption that selecting individuals who know each other will naturally result in higher trust and cooperation, as our findings show that social ties do not necessarily translate into higher prosociality towards one another. Second, it contributes to the theoretical understanding of social capital dimensions. While several authors also adopted the conceptualization of structural and cognitive social capital (Krishna and Uphoff, 2002; Janssens, 2010; Van Rijn et al., 2012; Story et al., 2020), to the best of our knowledge, very few explored how one dimension may influence the other and to what extent their measurements are correlated (Avdeenko & Gilligan, 2015; Claibourn & Martin, 2000; Glanville et al., 2013; Moore & Carpiano, 2020).

The article is organized as follows. The next section provides a literature review on social capital, VSLAs, selection bias, and the relationship between the different dimensions of social capital. Section 3 describes the materials and methods, illustrating the study area, hypotheses, sampling strategy, experimental and survey protocols, experimental sessions, and empirical strategy. Section 4 presents the findings, Section 5 discusses them, and Section 6 concludes.

2. Literature review

2.1. Social capital: conceptualization and measurement

Social capital is a complex and composite concept, and the literature abounds with ways to define its different dimensions or sub-components. Grootaert & Van Bastelaer (2002) define cognitive social capital as "shared norms, values, trust, attitudes, and beliefs," while structural social capital is described as a capital that "*facilitates information sharing and collective action and decision-making through established roles and social networks* supplemented *by rules, procedures, and precedents*." In the same book, Krishna & Uphoff (2002) explain that structural capital is somewhat more objective, containing visible elements and being shaped by group deliberation. Conversely, cognitive social capital is more subjective, focusing on people's thoughts and emotions. These two forms of social capital are complementary; they enable mutually beneficial collective action. Structural social capital, which comprises roles, networks, and other social relationships, facilitates cooperative behavior (Krishna & Uphoff, 2002).

Some scholars have introduced a third dimension: relational social capital. To some extent, one can consider relational social capital as a refinement of the cognitive dimension. Claridge (2018) defines cognitive social capital as shared understandings, including a common language, values, and attitudes. In contrast, relational social capital involves the nature and quality of relationships, encompassing trust, trustworthiness, norms, sanctions, obligations, expectations, identity, and identification. It is important to note that these dimensions of social capital should not be viewed as independent as in practice, they are interconnected.

In the absence of consensual definitions, and for the purpose of the present study, we chose to decompose social capital along two dimensions, cognitive and structural, as it was the case in previous studies in development economics (Krishna and Uphoff, 2002; Janssens, 2010; Van Rijn et al., 2012; Story et al., 2020).

Additionally, social capital is frequently associated with the strength of interpersonal connections, leading to differentiation between 'bonding' and 'bridging' social capital. The former refers to strong ties, such as those within the family, among close friends, and neighbors, while the latter refers to 'weak' ties, including those with distant friends, associates, and colleagues (Woolcock, 2001). In essence, bonding social capital operates within a group, while bridging extends to connections among social groups. Bonding social capital is tightly structured and exclusive, with potentially negative consequences, but it also represents a crucial source of social support, particularly in economically disadvantaged contexts (Claridge, 2018; Pertiwi and Muzayanah, 2022).

Regarding the measurement of social capital, it is worth noting that consensus is lacking, as pointed out by Fitzsimons et al. (2019). One of the main challenges is the measurement of individual behaviors. Survey-based instruments like the one developed by Grootaert & Van Bastelaer (2002) have been created to measure trust, trustworthiness, and cooperation in public goods, but their effectiveness has been questioned. This is particularly due to their susceptibility to desirability bias, and the fact that each individual tends to have his/her own subjective way of "scaling" (Avdeenko and Gilligan, 2015; Fitzsimons et al., 2019). An alternative approach to measuring behaviors is to involve individuals in experimental tasks. Such tasks are designed to reveal individuals' true preferences, based on proper incentives (see e.g. Azrieli et al., 2018; Bowles & Polania-Reyes, 2012; Holt & Laury, 2002). Typically, incentivized tasks used to measure cognitive social capital include the dictator game, the trust game and the voluntary contribution to a public good game (Karlan, 2007; Avdeenko and Gilligan, 2015; Nguyen and Rieger, 2017; Ban et al., 2020). These games reflect different facets of preferences that are closely related to cognitive social capital, i.e. trust and reciprocity, altruism and cooperativeness, respectively.

Our study aims to assess both structural and cognitive social capital, along with bonding and bridging social capital. These concepts are complex to measure and cannot be fully quantified (Fitzsimons et al., 2019). We use the term "cognitive social capital" to refer to measurements conducted during the lab-in-the-field sessions and survey measurements of trust, and we use the term "structural social capital" to refer to network measures (detailed below).

Finally, the distinction between pre-existing and externally induced social capital, as originally outlined by Bebbington and Carroll (2002) and Adhikari & Goldey (2010) among others, is a fundamental aspect of our analysis. Externally induced social capital materializes when an external agency brings individuals together, thereby fostering their collective engagement in various activities. The empirical findings of the above authors suggest that social capital is induced during the agency's active involvement but tends to decline after the departure of agency personnel. This deterioration is primarily attributed to non-compliance with established norms and the dominance of influential individuals (elite capture), among other contributing factors.

2.2. Village Saving and lending associations (VSLAs)

Community-based savings groups can take a variety of institutional forms, each characterized by distinct rules and objectives. The literature commonly identifies three types of savings groups: self-help groups (SHGs) (e.g. Desai and Olofsgård, 2019; Gugerty et al., 2019; Ban et al., 2020; de Boef et al., 2021), rotating savings and credit associations (ROSCAs) (e.g. Etang et al., 2011; Maitra et al., 2023; Zambrano et al., 2023), and village saving and lending associations (VSLAs) (e.g. Ksoll et al., 2016; Burlando and Canidio, 2017; Cassidy and Fafchamps, 2020; Marshall et al., 2023). This paper centers on VSLAs.

Savings groups have received accrued attention as they have been shown to improve savings and access to credit for both members and non-members through spillover effects (Cassidy and Fafchamps, 2020), and to increase food security and expenditures (Ksoll et al., 2016; Maitra et al., 2023). Saving groups have also been shown to be useful in the maintenance of water supply infrastructures (Marshall et al., 2023) and women's empowerment and mental health (Tadesse and Huang, 2022).

Village Savings and Loan Associations (VSLAs) are community-based microfinance groups that help poor rural households to save, accumulate interest, and obtain manageable loans. VSLAs have gained extensive traction across 77 countries, boasting a collective membership exceeding 20 million individuals.[4] VSLA are mainly promoted by non-governmental organizations (NGOs). The case study utilized in this research adheres to the framework commonly employed by NGOs worldwide.

To initiate the process of creating a VSLA, a community meeting (at the Ward level[5]) takes place to introduce the VSLA methodology. Next, individuals who express interest are encouraged to form groups consisting of 15–25 members. These prospective members are advised that they should be able to save modest sums, meet loan repayment obligations, exhibit honesty and cooperative behavior, and trust their fellow group members (Cassidy and Fafchamps, 2020; Tadesse and Huang, 2022).

Savings groups typically depend on pre-existing social connections to secure loan repayment and savings, and on social pressure as a means of enforcement (Burlando and Canidio, 2017; Ban et al., 2020). This also raises an issue of selection bias, as only well-connected individuals tend to self-select into these savings groups. Additionally, research has shown that members of vulnerable groups often have fewer social connections compared to their wealthier counterparts (Burlando and Canidio, 2017).

2.3. Selection bias and recruitment methods

Targeting needy populations poses a significant challenge for both international organizations and governments. The lack of information in rural areas is a major contributing factor to this issue. One common strategy used to address this challenge is the decentralization of beneficiary selection (Basurto et al., 2020; Roy, 2022). The underlying principle is to entrust local leaders with the task of identifying beneficiaries and disseminating program information (Cheng et al., 2022). There are two primary advantages to this approach: firstly, local leaders have better insights into the needs of the community, and secondly, they are more accountable to their villages, especially when they are elected or concerned about their reputation (Galasso and Ravallion, 2005; Casey, 2018; Basurto et al., 2020). Development initiatives may also rely on intermediaries (not necessarily local leaders) to disseminate program information and facilitate project delivery (BenYishay and Mobarak, 2019; Bandiera et al., 2023). However, both these approaches have their drawbacks. Indeed, depending on local leaders to select beneficiaries involves the risk of elite capture, which can lead to the exclusion of the truly needy (Galasso and Ravallion, 2005; Basurto et al., 2020). Additionally, it has been demonstrated that the effectiveness of intermediaries in project delivery hinges on their social connections within the community and can result in the targeting of non-poor individuals with ties to these intermediaries (Bandiera et al., 2023).

Another bias that is widely reported in the literature is the self-selection bias. It occurs when beneficiaries choose to participate in the project voluntarily rather than being included through random selection. This creates two main problems. Firstly, the selected beneficiaries may not volunteer even though the intervention was designed for them. For example, it has been shown that the poor spend less time and less money on collective activities, and only participate in community meetings when they expect to benefit directly (Mansuri and Rao, 2004; Arcand and Fafchamps, 2012). Secondly, self-selection bias is problematic especially if it is not considered when evaluating the program's impact. The observed impact on the outcomes of interest attributed to the projects may already exist due to pre-existing observable and unobservable individual characteristics. Further, if participation is not random, the distribution of the participants' characteristics will differ from the distribution of the true population's characteristics, which in turn, influences the external validity of the results (Heckman, 1990).

Lastly, a third bias to consider is site selection bias, which occurs when implementation agencies, such as NGOs, international organizations, or governments, decide where to carry out their projects. Numerous factors can influence these decisions, including accessibility, government choices regarding aid allocation to specific regions, and pre-existing levels of economic development that may enhance project success (Aldashev and Navarra, 2018; Briggs, 2021).

This study aims to investigate self-selection bias. While, as mentioned above, self-selection can occur depending on many individuals' characteristics, we hypothesize that part of the selection into VSLA groups is based on the selected individuals' participation in existing networks, i.e., their structural social capital.

2.4. Relationship between structural and cognitive social capital

To the best of our knowledge, only a few authors have examined the relationship between structural and cognitive social capital. Indeed, while numerous studies have measured both dimensions, very few actually explored whether one dimension is related to the other. Claibourn & Martin (2000) investigated the relationship between interpersonal trust and group memberships using data from 1973 and 1982 collected in the USA. Their findings failed to identify a robust causal link between the two variables. Similarly, Glanville et al. (2013) examined the correlation between trust levels and informal social connections, as well as whether changes in social connections could lead to changes in trust within the United States. These authors found that informal ties enhance trust. Although their study was longitudinal which reduces risk of endogeneity and omitted variable bias, they only used self-reported measure of generalized trust.[6] (Moore and Carpiano (2020)) also used panel data and self-reported measures to examine the link between dimensions of social capital. While their conceptualization of social capital differs slightly from ours, they are also interested in the relationship between cognitive and structural social capital. They did not identify any significant evidence supporting the notion that one dimension of social capital causally influences the other. In their words, "there was no social capital measure that stood out as a consistent predictor of

[4] Based on information on the website https://www.vsla.net, maintained by VSL Associates, an organization that provides training in setting up VSLAs (site accessed on October 26, 2023).

[5] A Ward is an administrative division within a district. In Murehwa, a Ward is composed of 12 to 18 villages. Approximately, 1,500 to 2,000 households live in one Ward.

[6] For this study, they used the General Social Survey from 2006 to 2008. Three self-reported questions on trust were used. One asking if people try to be helpful or only look after themselves, one enquiring whether people try to take advantage or to be fair, and finally, one asking if people can be trusted or not.

generalized trust or any other social capital measure.".

We only found two papers that use experimental data to measure the relationship between dimensions of social capital.[7] Binzel & Fehr (2013) implemented a lab-in-the-field in Cairo to measure the impact of social distance on trust. Participants played a trust game with friends and strangers, and the findings indicated that trust levels were higher among socially proximate individuals than in interactions with strangers. This study is particularly pertinent with respect to ours, as it investigates how social ties influence trust levels. Avdeenko & Gilligan (2015) show that subjects display higher levels of trust and trustworthiness when there are more family members and friends in their experimental session.

3. Materials and methods

This section begins by presenting the context in which the survey took place and how the expansion of an NGO program provided the ideal opportunity to measure pre-existing levels of social capital among the selected beneficiaries. Next, we outline the hypotheses that motivated our data collection. Following this, we detail the experimental protocol and the reasoning behind our methodological choices. Finally, we describe the empirical strategy used to analyze the collected data.

3.1. Study area

This study was conducted in the Murehwa district, located approximately 75 km northeast of Harare in Zimbabwe's Mashonaland Province (Fig. 1). Murehwa is a rural district where most residents are smallholder farmers (Rusinamhodzi et al., 2013). The district represents a typical case of smallholder farming in Sub-Saharan Africa, where landholdings are small (typically less than 2 ha), farmers are resource-constrained, and they face increasing challenges from climate change.

In 2016, the Murehwa district had 45,442 households, with 9,442 classified as food-poor (ZimStat, 2016). Farmers predominantly engage in subsistence farming and practice mixed crop-livestock farming with maize as the primary crop cultivated followed by legumes such as groundnuts and beans. They grow crops for home consumption, and selling any surplus in the market. However, due to dry spells, input shortages, socio-political instability, and limited production skills, maize yields are relatively low. Development agencies working in the area have promoted the adoption of horticultural crops as a diversification strategy, given the availability of groundwater and the potential for higher market returns. This push toward horticulture is particularly relevant to our study, as it often requires coordination among farmers for collective marketing and resource pooling.

Our study was only conducted in communal areas as they constitute the primary agricultural demographic in this region.[8] The colonial administration created Communal areas for the Indigenous population, which typically had lower agricultural potential. Today, land tenure is normally based on customary land tenure systems. These systems are characterized by communal landownership and are administered by local traditional leaders.

We evaluated the social capital of participants of a project implemented by a local NGO. This project's primary objective, which started in 2021 and will end in 2024, is to support horticultural production. It operates as a capacity-building initiative, with the local NGO training beneficiaries. The training encompasses all stages from pre-production to post-production. Beneficiaries receive training in climate-smart agricultural practices and market accessibility, i.e., understanding market demands and aligning production accordingly. To cope with the problem of farmers' limited financial resources, the project also encourages the establishment of VSLAs.

In May 2022, the project reached 1,471 primary beneficiaries and 6,407 secondary beneficiaries in Murehwa district. While the project primarily targets horticultural farmers, the VSLA aspect is open to all community members. The NGO applies a decentralized approach to identifying VSLA beneficiaries, allowing it to reach marginalized populations and educate key stakeholders in VSLA methodologies to guarantee sustainability.

The NGO organizes Ward-level meetings with stakeholders during which the VSLA methodology is introduced. Following this meeting, the community is encouraged to nominate a village agent (VA) who is then directly trained by the NGO on the VSLA methodology. The VA is then tasked with promoting the VSLA methodology within each village of their Ward.[9] It is important to note that the NGO does not pay the VA; instead, they receive a bicycle and airtime to facilitate communication with beneficiaries.

Qualitative interviews revealed that VAs reach out to every village leader in their Ward to inquire about upcoming community meetings during which they can present the VSLA methodology to villagers. After presenting the method, the VA shares their contact information and explains that anyone interested in starting a VSLA can contact them. The VA emphasizes that VSLAs should group individuals who share similarities, are cooperative, and show characteristics such as honesty and reliability. Such factors can be related to trust, trustworthiness, and willingness to cooperate (Allen and Staehle, 2007). Once contacted, the VA visits the soon-to-be VSLA and provides training to its members. The VA is responsible for guiding the group in setting up the VSLA, monitoring its activities and reporting back to the NGO. The VA is expected to attend every meeting they helped establish by the VSLA.

3.2. Hypotheses

This section presents our three study hypotheses.

The first hypothesis emerged from our observation that the development agencies that foster VSLAs share the same strategy: they work with groups that already exist or ask communities to form groups the agency can then work with (Burlando and Canidio, 2017; Ban et al., 2020). In so doing, the development agencies look for the 'visible' component of social capital: the structural one, which corresponds to networks. We wanted to know whether the selected individuals indeed have more social connections and whether the formation of VSLAs is based on pre-existing social connections. This hypothesis tests the effectiveness of the development agency's strategy to select individuals with higher structural social capital, thereby introducing a selection bias.

H1: Structural social capital is higher in selected individuals than in control individuals.

The second hypothesis investigates whether there is a higher level of

[7] Here we do not mention papers that examine the relationship between different measures of the same SC dimension. For instance, many papers assess the relationship between self-reported and experimental measures of what we categorize as cognitive social capital (Murtin et al., 2018).

[8] Following the different land reforms since independence, smallholder farms in Zimbabwe include communal area households, old resettlement households, and A1 households. The original land reform created old resettlement and A1 farms (1980–1999). The Fast-Track Land Reform Program was implemented in 2000 by subdividing and redistributing what were previously large-scale commercial farms (Moyo, 2011).

[9] Some concerns may arise regarding the potential for elite capture or favoritism in participant selection by the VA. The bias introduced by intermediaries is an important consideration in development projects. However, our interviews with multiple village agents suggest that this risk is minimal in this implementation context, as the recruitment process follows a standardized and transparent approach. More importantly, even if some level of village agent bias existed, it would not affect our research findings on whether beneficiaries have initially stronger connections and trust within their VSLA groups. For a broader discussion on the role of local intermediaries in development interventions, see Bandiera et al. (2023).

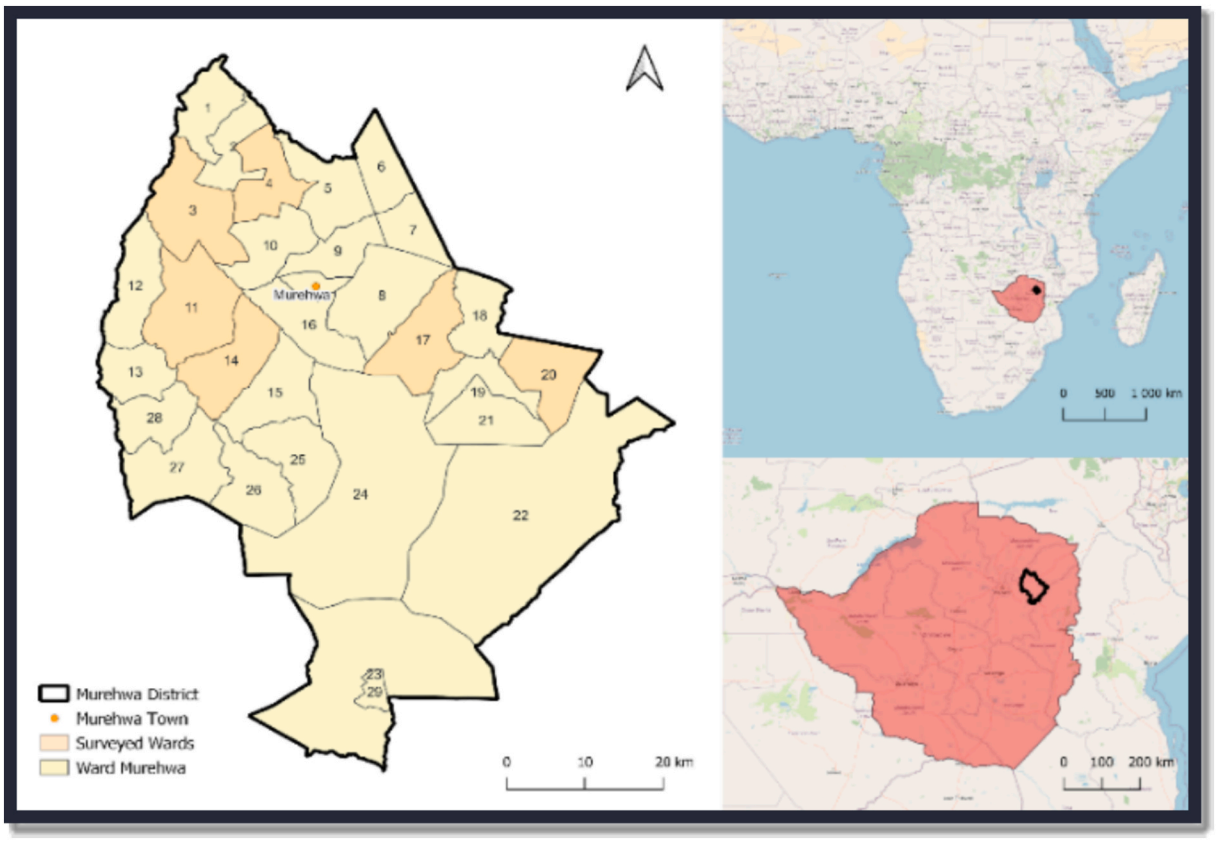


Fig. 1. Map showing the location of the study area in Zimbabwe.

cognitive social capital in selected individuals than in control groups.

H2: Cognitive social capital in selected individuals is higher than in control individuals.

The third and last hypothesis shifts away from comparing selected and control individuals. It is based on the common assumption that having a denser social network is related to increased trust among its members (e.g., Avdeenko and Gilligan, 2015; Nguyen and Rieger, 2017).

H3: A correlation exists between indicators of structural and cognitive social capital.

3.3. Sampling strategy

Data collection and the game sessions took place in October 2022. Although the project began in 2021, a second wave of VSLA group formation occurred in October 2022. The NGO provided the exhaustive list of the 37 prospective VSLAs in the Murehwa district who had registered with the VA but had not yet received training in the VSLA methodology. This list included details on the association's location (village and Ward), total membership count, the ratio of male to female members, and the contact information of the delivery agent associated with each prospective VSLA association. From this list, we randomly selected 10 future VSLAs (Fig. 2).[10][11][12]

The members of each VSLA (i.e., selected beneficiaries) were then asked to participate in the experimental session. At this point, the VSLA members have not yet gone through training or started the VSLA process. These volunteers willingly registered with the NGO to become beneficiaries of the VSLA program (Fig. 3).

Borrowing from the impact evaluation framework,[13] we constituted a control group. The sampling of control individuals was facilitated by the NGO's field agents, extension officers, village agents, and village leaders. Without specific data, we asked these key informants to assemble groups of 20 individuals with similar socio-demographic characteristics to those of the selected individuals. Specifically, they were instructed to create groups comprising participants from the same communities of comparable ages to those of the selected individuals. Additionally, the proportion of men and women in the control experimental sessions was intended to mirror that of the selected experimental sessions (Fig. 2). Participation in the survey was voluntary both for the selected and control individuals.

We gathered data from 341 individuals, of which 143 were selected individuals (selected beneficiaries) and 198 were control individuals (non-beneficiaries), spread across five Wards.

3.4. Experimental protocol and questionnaires

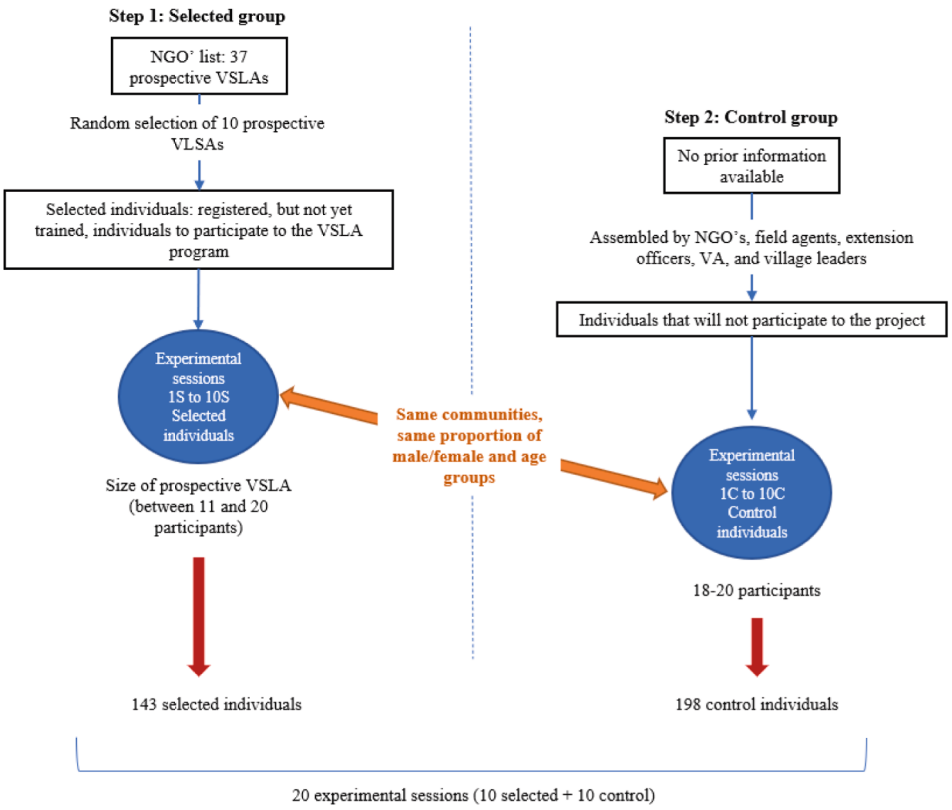
Table 1 presents a synthesis of the experimental protocol and questionnaires. The table illustrates the main topics analysed ('Analysis'), the methods deployed ('Methods'), and the dimensions of social capital addressed by each method ('Dimension of SC investigated'). This section details every step taken to collect the data.

[10] Given the VSLA recruitment strategy, we do not expect the VSLA population to be representative of the district.

[11] One Ward was removed from the sampling base as it was located in a resettlement area.

[12] As the members of one of the prospective VSLAs that we had planned to survey were not available on the day of the survey, we randomly selected another association as a replacement.

[13] For impact evaluation, it is common to compare 'treated individuals' with 'control individuals'. The sampling is conducted so that the only difference between the treated and control groups is that the former participated in a program or project. In our case, we do not have treated individuals, but rather selected individuals, as they have not yet participated in the project.



Note: '1S' means 'Session 1 of the selected group' and '1C' means 'Session 1 of the control group.'

Fig. 2. Sampling strategy. Note: '1S' means 'Session 1 of the selected group' and '1C' means 'Session 1 of the control group.'.

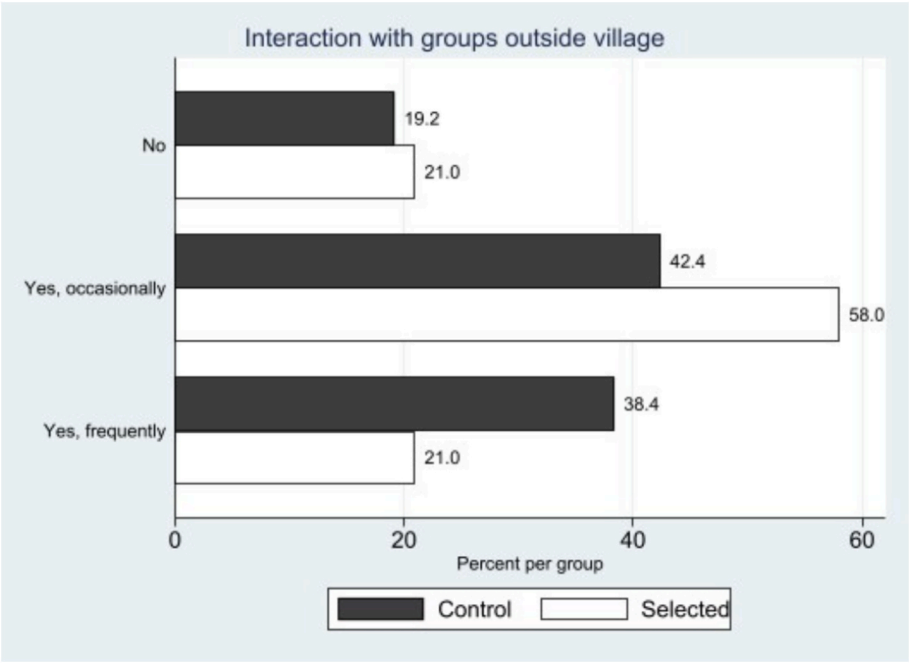


Fig. 3. Interactions of individuals with groups outside village.

3.4.1. Measuring cognitive social capital

We measured cognitive social capital by having the subjects complete four experimental tasks, each capturing one facet of the participants' pro-sociality: (i) altruism, measured by the amount given in a dictator game; (ii) trustfulness, measured by the amount sent in a trust game; (iii) trustworthiness, measured by the amount reciprocated in the trust game; and (iv) cooperativeness, measured by the level of contribution in a public good game (Table 1).

Table 1
Comprehensive scheme of the methods used in the field to collect data.

Analysis	Method*	Dimension of SC investigated	References
Measuring Cognitive Social Capital	*Dictator Game*	Altruism	Forsythe et al. (1994)
	Trust Game	Trust, Reciprocity	Berg et al. (1995)
	Public Good Game	Cooperativeness	Mark Isaac et al. (1985); Cox et al. (2013)
	Self-reported behavioral measures	Risk-tolerance, patience and trust	Glaeser et al. (2000); Frederick et al. (2002); Weber et al. (2002); Dohmen et al. (2011); Falk et al. (2023)
Measuring Structural Social Capital	Integrated Questionnaire for the Measurement of Social Capital (SC-IQ)	Groups and networks, collective action and cooperation, information and communication, social cohesion and inclusion, and empowerment	(Adapted from) Grootaert et al. (2004)
	Grid on the relationships with other participants in a session	Reported level of relationships among the participants during a session	(Adapted from) (Avdeenko and Gilligan (2015))
Collecting socio-economic information	Questionnaire	No specific dimension of SC. Variables investigated: gender, age, education level, crop diversity, and food security, etc.	Roopa and Menta Satya (2012); Schleef (2014); Bihu (2021)

* In italic experimental methods.

When analyzing the measures of trust and trustworthiness offered by the trust game, questions may arise as to what can be attributed to actual trust and reciprocity and what can be attributed to other-regarding preferences that are not conditional on the behaviors of others. Indeed, it may be that an individual is sending a given amount not because they expect something in return, but because of a preference for giving, altruism or guilt aversion. The amount sent by the trustor might not only be directed by selfish motives or expectations of return (e.g., Glaeser et al., 1999; Cox, 2004; Ashraf et al., 2006; Sapienza et al., 2013). Similarly, the amount returned by the trustee might not be simply motivated by the desire to reciprocate, but by unconditional kindness (Cox, 2004; Cardenas and Carpenter, 2008; Charness and Shmidov, 2014; Alós-Ferrer and Farolfi, 2019). Cox, 2004; and Ashraf et al., 2006; developed experimental methods aimed at breaking down the components of trust, making it possible to isolate pure trust from other facets of social preferences that might be captured by the trust game, such as altruism or generosity. Nevertheless, given our objective, we relied on the standard trust game, which is also easier to implement in the field. Although we acknowledge that the Berg et al. (1995) measure of trust might capture other dimensions, we thought that this multidimensional aspect would not reveal a difference between the two types of participants, especially since we found no difference in our own data.

We relied on the strategy method (Selten, 1967), wherein each participant played both roles in the dictator game and in the trust game. In addition to their decisions, we also asked subjects about their beliefs.[14] In the dictator game, they had to choose how much to give in the dictator's role and to estimate how much the dictator would transfer in the recipient's role. In the trust game, participants were first asked how much they would transfer when playing the role of trustor and how much they would return when playing the role of the trustee. Finally, in the public good game, they had to decide how much to contribute and how much they thought the total contribution would be. Below, we provide additional details about the experimental procedures.[15] At the beginning of every experimental session, each subject was given US$2 as a show-up fee.

Dictator Game (DG) (Forsythe et al., 1994). The two roles were explained to the particiants: Player 1, the "sender", and Player 2, the "receiver", who is a passive player. Player 1 was endowed with US$4 and could choose to send 0, 1, 2, 3, or 4 units to Player 2 (Appendix 1, part 1 – Q1). In the role of Player 1, participants were tasked with estimating how much Player 2 expected to receive from them (Appendix 1, part 1 – Q2). Subsequently, in the role of Player 2, participants were asked to predict how much they would receive from Player 1 (Q3). The amount transferred by Player 1 reflects their level of altruism/generosity, as Player 1 faces no risk of retaliation from Player 2 for deviating from the norm of equal sharing (Larney et al., 2019).

Trust game (TG) (Berg et al., 1995). The trust game is a two player two-stage game. Player 1, hereafter "investor", acts as a trustor and player 2 acts as a trustee. Both players have equal endowments (US$4). In stage 1, the investor chooses how much to send (0, 2 or 4) to the trustee (Appendix 1, part 1 – Q4). Both players are aware[16] that the amount sent by the investor will be multiplied by 3 by the experimenter before it reaches the trustee's hands. The trustee was asked "how much will you return to player 1 if you receive US$6?" (Appendix 1, part 1 – Q5a), the same question being repeated in the scenario in which he/she received US$12 (Appendix 1, part 1 – Q5b). These two questions enabled us to measure trustworthiness/reciprocity. All estimates were in US$. Like in the DG, we used the strategy method (Selten, 1961) so that each subject played both roles.

Public good game (PGG). The PGG is a four-player simultaneous game designed to measure the participants' cooperativeness. Each player receives the same initial endowment, US$4, and is subsequently asked how much he/she wants to contribute to a group account (0, 2, or 4 dollars). The total contribution (the sum of the contributions made by the four players) is multiplied by 2 by the experimenter and the outcome divided equally among them, a rule that is common knowledge (Appendix 1, part 1 – Q6). Subjects were also asked how how much they believed the other group members would contribute (together, i.e. the combined contribution) to the group account (Appendix 1, part 1 – Q7). Possible answers were restricted to integer numbers between 0 and 12.

In addition, we used self-reported behavioral measures as complementary measures of cognitive social capital Appendix 1, part 2). Such questions provide an additional measure of cognitive social capital although they might not be as accurate as the lab-in-the-field measures since they are stated behaviors and may be subject to social desirability bias (Ban et al., 2020). This section of the questionnaire included questions on risk-tolerance, patience and trust. Answers were provided either on a Likert scale or a binary measure, depending on the question (see Appendix 3 for the description of all the variables).

3.4.2. *Measuring structural social capital*

The measures of structural social capital are the following. First, we used the Integrated Questionnaire for the Measurement of Social Capital (SC-IQ) (Appendix 1 – part 3), adapted from Grootaert et al. (2004) (Table 1). The questionnaire was designed to encompass five dimensions: (1) groups and networks, (2) collective action and cooperation, (3) information and communication, (4) social cohesion and

[14] Beliefs were not incentivized.
[15] The questionnaires given to the participants are included in Appendix 1.
[16] This is « common knowledge » because the instructions are read aloud by the experimenter in each session.

inclusion, and (5) empowerment. These dimensions enabled us to assess the extent of household participation in social organizations and informal networks, how the participants collaborate with others, the frequency of their interactions with others, and their sense of empowerment. In particular, the question, "Does this group work with or interact with groups outside the village/neighborhood? No; Yes, occasionally; Yes, frequently," allowed us to identify both bonding and bridging social capital.

Second, we used a grid adapted from Avdeenko & Gilligan (2015) (Appendix 1, part 4) designed to elicit the reported level of relationships among the participants during a session. For example, we asked each subject to specify how many family members were present in the session. This information was gathered across different categories of social relationships, including (1) basic social relationships, (2) economic relationships, (3) voluntary groups, (4) favor exchange relationships, and (5) trust-based groups. From this relationship matrix, we computed the proportions of each type of social tie as the number of subjects in the experimental sessions varied. For each question in the matrix, we calculated the following:

$$\frac{\textit{number of subject related to}}{\textit{total number of subjects in session} - 1}$$

For instance, the variable "family members" represents the proportion of subject *i*'s family members in subject *i*'s experimental session.

3.4.3. Socio-economic questionnaire

Lastly, participants completed a questionnaire that provided essential socio-demographic variables including gender, age, education level, crop diversity, and food security as advised by Chuang & Schechter (2015) (Appendix 1, part 3) (Table 1).

3.5. Experimental sessions

Each session involved from 10 to 25 participants. Adequate physical distancing was maintained among them. The games and questionnaires were administered using pen and paper, and all the instructions and questionnaires were provided in English. Enumerators were organized in two teams, each consisting of a leader and two assistants, all of whom were Zimbabwean nationals and spoke the local language. The team leader's responsibility was to explain the experimental tasks and questionnaires in Shona, the local language, to be sure all participants fully understood the tasks. This is particularly important in developing countries where illiteracy is prevalent (Cardenas & Carpenter, 2008). Team leaders had undergone joint training and were coordinated to guarantee uniform translations across all sessions and adherence to the same protocol. The assistants were tasked with providing individual assistance to participants who had difficulty understanding the tasks or completing the questionnaires. Additionally, the assistants were responsible for collecting the completed questionnaires, calculating and distributing payoffs. None of the researchers were directly involved in administering the questionnaire.

During the sessions, the games were referred to as blue, red, or green, rather than DG, TG, or PGG. After all three games had been played, an outsider, typically a child, randomly selected a blue, red, or green ball. The color chosen determined which game participants would be compensated for taking part. Pairings in the blue:DG and red:TG, or group formation in the green:PGG, were then randomly conducted by the assistants to determine the final payoffs.

3.6. Empirical strategy

We present simple regression-based differences-in-means between selected and control individuals. For each measure of structural and cognitive social capital, we compute the following OLS regression:

$$Y_i = \alpha + \beta T_i + \varepsilon_i$$

where Y_i is the outcome of interest, α the constant, β the selection effect, T equal to 1 if subject i is selected, 0 otherwise, and ε_i the error term. The constant represents the mean for the control group. This empirical strategy replicates the one developed by Avdeenko & Gilligan (2015). Like them, we chose not to include any control variables in our regressions. Robustness checks showed that the results did not change significantly when control variables were included in the model.[17] Regressions are clustered at the Ward level, as we consider that observations within the same Ward may be more correlated with each other than with observations in other Wards. To check the robustness of our model, we also ran the OLS regression clustered at village level. The results closely resemble those clustered at the Ward level and are presented in Appendix 2. The results of the regressions with Ward dummies and clustered at the village level, which make it possible to control for unobserved Ward-specific characteristics are also included in Appendix 2. We chose to include Ward dummies rather than village dummies because selection for and implementation of many NGO and government projects take place at the Ward level.

We measure social capital in many different ways in order to be as comprehensive as possible. However, the more variables there are, the more statistical tests are needed, which increases the risk of false positive (Anderson, 2008; Cameron et al., 2015). To test the robustness of our results, outcomes were normalized through Z-scores before being aggregated in order to compute mean effects (Anderson, 2008; Avdeenko and Gilligan, 2015; Cameron et al., 2015).

4. Findings

In this section, after presenting the results of the balancing test, we present the main results of our analysis. Findings 1 to 3 support hypothesis 1. Findings 4 to 6 support hypothesis 2, while finding 7 support hypothesis 3.

Our sample was predominantly female, 84 % of the participants were women, the average age of the participants was 47 and the average household had 6 members.

Table 2 lists the results of balancing tests, which assess the similarities between the selected and control groups in terms of observable characteristics. While most attributes were closely aligned, two variables were statistically significant. First, proximity to the nearest market indicated that, on average, the selected groups are located farther from markets than the non-selected groups, but in practical terms, the 10-minute difference is not substantial. The second difference concerned the receipt of remittances, with a higher proportion of selected individuals receiving remittances than the control group. However, it is worth underlining that the results of the Kolmogorov-Smirnov test, which assesses distribution equality, were non-significant (Table 3.)

Finding 1: The average number of relations per selected individual is higher than per control individual.

Table 4 presents the average selection effect on the number of social ties within groups (based on the relationships matrix). The mean effect for "All relations" is statistically significant (p-value < 0.001). Furthermore, with the exception of Economic Relationships all the categories of mean effects are statistically significant (p-value < 1 %).

However, the categorization of simple variables into groups of variables can be somewhat arbitrary, although we followed Avdeenko &

[17] The control variables included were the following: gender, age, household size, education, marital status, minutes from the nearest market on foot, number of cows owned by household, number of crops cultivated by household, remittance (dummy), off-farmer activity (dummy) and the variable "cut or skipped meal because not enough food (dummy)." The results both in terms of magnitude and statistic significance did not change. Balancing tests are presented in Table 2 for these variables.

Table 2
Balancing tests.

Variables	(1)	(2)	(3)	(4)
	Sample mean	Control mean	Selected mean	Difference
Observations	341	198	143	341
Gender	0.839	0.823	0.860	0.037
	(0.368)	(0.382)	(0.348)	(0.040)
Age	47.359	46.843	48.070	1.227
	(13.476)	(14.041)	(12.671)	(1.481)
Household size	5.566	5.545	5.594	0.049
	(2.236)	(2.396)	(2.001)	(0.246)
Education	2.619	2.621	2.615	−0.006
	(0.700)	(0.722)	(0.671)	(0.077)
Marital status	2.387	2.364	2.420	0.056
	(0.859)	(0.866)	(0.851)	(0.094)
Minutes from nearest market on foot	37.173	33.803	41.839	8.036***
	(23.631)	(23.617)	(22.924)	(2.560)
Number of cows owned by household	0.742	0.672	0.839	0.167
	(1.399)	(1.374)	(1.432)	(0.153)
Number of crops cultivated by household	5.029	5.005	5.063	0.058
	(1.363)	(1.369)	(1.359)	(0.150)
Remittances (dummy)	0.371	0.323	0.437	0.113**
	(0.484)	(0.469)	(0.498)	(0.053)
Off-farm activity (dummy)	0.466	0.485	0.441	−0.044
	(0.500)	(0.501)	(0.498)	(0.055)
Cut or skipped meal because not enough food (dummy)	0.575	0.591	0.552	−0.038
	(0.495)	(0.493)	(0.499)	(0.054)

Standard errors are in parentheses;
*** p < 0.01, ** p < 0.05, * p < 0.1.

Table 3
OLS Results for the Selection Effect[1] in terms of social ties (N = 341).

	Basic Social Relationships				Economic Relationships		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Family Members	Neighbors	Get together socially	Attend the same church	Buy or sell products or services with	Employed at same farm or shop	Work for
Selection Effect	0.0307*	0.0342**	0.2921***	0.0831	0.0495	0.0036	0.0248*
	(0.0135)	(0.0116)	(0.0685)	(0.0469)	(0.0853)	(0.029)	(0.011)
Constant	0.0131**	0.0465***	0.2093***	0.0819***	0.1692***	0.0708***	0.0132
	(0.0041)	(0.0076)	(0.0326)	(0.018)	(0.033)	(0.0165)	(0.008)
Mean effect	0.8933***				0.2052		
	Voluntary Groups			Favor Exchange Relationship		Trust-based Groups	All Relations
	(8)	(9)	(10)	(11)	(12)	(13)	
	Member of same producers' group	Member of the same water user association	Attend parent-teacher association meetings with	Seek advice from	Watched your children	Exchange labor with	
Selection Effect	0.161**	0.0505***	−0.0508	0.0698***	0.0113	0.0815*	
	(0.0569)	(0.0111)	(0.1543)	(0.0149)	(0.0068)	(0.0325)	
Constant	0.073***	0.0731**	0.6092***	0.0448***	0.0215***	0.0419***	
	(0.0142)	(0.0198)	(0.1098)	(0.005)	(0.0028)	(0.0043)	
Mean effect	0.4433**			0.7156**			0.6426***

Regression clustered at the Ward level.
Standard errors are in parentheses.
*** p < 0.01, ** p < 0.05, * p < 0.1.
Note: The dependent variables are the proportions derived from the relationship matrix. They are computed as follows: number of relationships per individual *i* divided by the total number of participants in the session. This gives the proportion of each type of relationship for each subject.
[1]Here the Selection Effect is calculated as the difference between the average values of the dependent variables in control individuals and in selected individuals.

Gilligan (2015) and Ban et al. (2020). Considering each variable in detail, 8 out of 13 are statistically significant. In terms of magnitude, the biggest differences are in social gatherings, and participation in producers' groups. For example, in the control group, individuals reported taking part in social gatherings, with an average of 20.93 % of the people present in their sessions and this figure increased to 51.14 % in the selected group. To complete the individual analysis, we also computed the network density for each experimental session (Wasserman and Faust, 1994), thus obtaining a group measurement. We compared the mean density of the 10 control and 10 selected groups, and obtained results similar to those obtained with individual measurements (data not shown).

These results were expected, as the implementing agency encourages interested individuals to form groups with people they already know. The results are consequently evidence that the agency's recruitment strategy is effective. They also to some extent support the argument presented in the literature that CBD projects leverage existing social capital (Chase and Christensen, 2010; Ban et al., 2020). Additionally, they are evidence of a selection bias that will need to be considered when analyzing the project impact: individuals with stronger social connections are more inclined to participate in the VSLA.

Finding 2: Selected Individuals are members of more groups than control individuals.

Table 4 presents additional structural social capital measures based

Table 4
Effect of Selection on Variables Related to Structural Social Capital (N = 341).

	(1)	(2)	(3)	(4)
	Number of groups to which the individual belongs to	Number of close friends	Can turn to people to ask for money	Interaction with groups outside their village
Selection effect	1.2319**	0.0579	0.1896	−0.1919
	(0.2425)	(0.3688)	(0.1288)	(0.1325)
Constant	3.4394***	1.9141***	3.9293***	1.1919***
	(0.3502)	(0.1253)	(0.1084)	(0.0935)

Regression clustered at the Ward level.
Standard errors are in parentheses.
*** p < 0.01, ** p < 0.05, * p < 0.1.
Note: To check the robustness of the variables in columns 3 and 4, we conducted ordered probit regressions, as they are more suitable for categorical variables. The probit regression for the variable 'can turn to people to ask for money' shows a statistically significant selection effect. However, for consistency with the other variables and following Avdeenko and Gilligan (2015), we present the OLS results in the main text. The ordered probit results are provided in the Appendix.

on the SC-IQ questionnaire adapted from Grootaert & Van Bastelaer (2002). The group membership counts for selected individuals were significantly higher (p-value = 0.005). On average, control individuals were members of 4 groups, while selected individuals were members of 5 groups. This result gives a complementary view to structural capital in the surveyed communities, indicating that selected individuals are better connected.

However, these results are mitigated by two other variables presented in Table 4. Selected individuals did not appear to have more close friends or more people to whom they can turn to ask for money (Table 4, columns 2 and 3). This suggests that, despite being more connected, they may not necessarily have more trusted individuals in their circle than the control group. To some extent, these variables reflect the quality rather than the quantity of their relationships, indicating that having more connections does not necessarily correspond to better relationships.

Finding 3: Selected individuals interacted less with outsiders than control individuals.

When asked if the group they consider to be the most important for their household interacted with groups outside the village, selected individuals mentioned less frequent interactions with outside groups[18] (Table 4, column 4). More precisely, as indicated in Fig. 2, 38.4 % of control individuals declared that their most important group frequently interacts with groups outside their village, as opposed to 21 % of selected individuals (chi-square test, p = 0.002). This finding suggests that selected individuals possess a higher degree of bonding social capital than control individuals.

Finding 4: In the incentivized experimental games, selected individuals were not significantly more trustful than control individuals.

Table 5 presents the individuals' selection effects on cognitive social capital that were measured experimentally in the lab-in-the-field settings. This table enabled us to determine the statistical significance of the observed differences. Table 4 also includes the magnitude of the effects using Cohen's D. The mean effect for "All behaviors" is not statistically significant (p-value = 0.515).

For the trust game, only one of the reciprocity coefficients was significant. In the selected group, when player 2 received $6, he/she sent back 55.5 % (i.e., $3.32), corresponding to 7.33 % more than in the control group, where the amount sent back was 48.15 % (p-value = 0.002). This means that, on average, subjects returned half of what was sent to them. It is worth noting that this does not correspond to the fair amount. To be fair, participants should have sent two thirds of what was returned to them. This variable also had the highest Cohen's D value (Cohen, 1995) compared to all the experimental measures: |0.2916|.

We also identified the 'type' of individuals present in our sample as selfish, reciprocal or equitable (i.e., fair). A subject is considered selfish if he/she sends a third or less back, reciprocal if he/she sends back between 1/3 and 2/3, and equitable if he/she sends at least 2/3 back. Table 6 list the mean comparison between selected and control for each of the aforementioned types. The equitable types were more frequent among the selected individuals than selfish types and reciprocal types.

All the other selection effects in the dictator and trust game were not significant (beside the reciprocity measures), and the Cohen's D values were below |0.20|. Therefore, we can conclude that the effect sizes of these variables are relatively small.

In the public good game, there were no significant differences between the selected and control individuals in terms of total contributions or in the total amount expected. If anything, selected individuals tended to contribute less. However, as this result is not significant, it is not conclusive. Further, the Cohen's D was small, indicating an insignificant effect size.

[18] This variable is significant (p-value < 10%) if the regression is clustered at the village level, and (p-value < 5%) if Ward dummies are introduced. When the cluster is at the Ward level, the coefficient of the variable is not significant.

Table 5
Effect of selection on experimental measures of pro-social behavior.

	Dictator Game		Trust Game				Public Good Game		All Behaviors
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	
	Amount sent by P1	Amount expected by P2	Amount sent by P1	Reciprocity US$6	Reciprocity US$12	Reciprocity (average)	Contribution to public good	Total contribution expected	
Selection effect	0.1127	−0.0637	0.1422	0.0733***	0.0397	0.0565***	−0.1142	−0.0754	
	(0.0676)	(0.1089)	(0.1212)	(0.0128)	(0.022)	(0.0115)	(0.1315)	(0.3417)	
Constant	1.9293***	1.8889***	2.1515***	0.4815***	0.4638***	0.4726***	2.7576***	7.7677***	
	(0.0607)	(0.0469)	(0.0732)	(0.014)	(0.0128)	(0.0108)	(0.0409)	(0.277)	
Observations	341	341	341	341	341	341	341	341	
R-squared	0.0069	0.0014	0.0044	0.0204	0.0092	0.0189	0.0031	0.0001	
Cohen's D	−0.1678	0.0763	−0.1338	−0.2916	−0.1952	−0.2808	0.1135	0.0238	
Mean effect	0.1157*						−0.0692		0.0695

Standard errors are in parentheses.
Reciprocity (average) was not included in the computation of the mean effect as it is merely an average of reciprocity US$6 and reciprocity US$12.
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 6
Mean comparison of the types of subject.

	Selected	Control	Difference	Std. Err.
Dummy selfish – reciprocity (6)	0.035	0.061	0.026	0.024
Dummy selfish – reciprocity (12)	0.084	0.101	0.017	0.032
Dummy selfish – reciprocity (average)	0.077	0.116	0.039	0.033
Dummy equitable – reciprocity (6)	0.566	0.404	−0.162***	0.054
Dummy equitable – reciprocity (12)	0.217	0.126	−0.091**	0.040
Dummy equitable – reciprocity (average)	0.245	0.167	−0.078*	0.044
Dummy reciprocal – reciprocity (6)	0.399	0.535	0.137**	0.054
Dummy reciprocal – reciprocity (12)	0.357	0.495	0.138**	0.054
Dummy reciprocal – reciprocity (average)	0.678	0.717	0.039	0.050
Observations	143	198		

Standard errors are in parentheses.
*** p < 0.01, ** p < 0.05, * p < 0.1.

Finding 5: The amount sent by Player 1 in the trust game is due to other-regarding preferences rather than to trust.

It is notable that the mean effect of the combination of the dictator and the trust games is significant (p-value < 10 %). This suggests another explanation for the difference between the amounts sent to player 2 in the Dictator and in the Trust games.

No significant difference was found between selected and control individuals in the amount sent in either the trust or the dictator games. Nevertheless, the amount transferred by player 1 in the trust game was significantly larger (5.75 %) than in the dictator game. The magnitude of the difference suggests that most of the amount sent by the trustor could be imputed to unconditional other-regarding preferences (altruism) and not to the fact that subjects trust each other. Cox (2004) and Dufwenberg and Gneezy (2000) obtain a similar result.

Finding 6: Selected individuals were not significantly more trustful than control individuals in the self-reported measures.

Table 7 lists the findings related to self-reported measures of trust and risk tolerance. When it comes to trust, only the selection effect of the stated trust towards members of the same family was statistically significant (p-value = 0.058). Selected individuals stated they trusted members of their family more than did control individuals. However, the difference in magnitude was not large (less than 1 point). Selection effects were not significant for trust in general and in trust in other members of the same village. In other words, these results agree with what we observed in the experimental tasks. Self-reported methods did not prove to be poorer than lab-in-the-field games in eliciting trust and other social capital-related measures, as also demonstrated by previous research (Cameron et al., 2015; Fitzsimons et al., 2019).

Table 6 also presents measurements of risk tolerance based on Dohmen et al. (2011). The first risk tolerance variable assesses general willingness to take risk, while the second one assesses willingness to take financial risks. None of the coefficients were statistically significant, indicating no difference in terms of risk preferences between the selected individuals and those in the control group. Measuring risk tolerance is key as it can potentially confound pro-sociality measures. Indeed, individuals with high risk tolerance may appear less trusting, even though in reality, their behaviors are driven by their aversion to risk (Avdeenko and Gilligan, 2015). Our data showed a positive non-significant correlation between risk and trust in family and village members, and a negative, non-significant one between risk and general trust.

Finding 7: Repeated interactions and reciprocal relationships may

Table 7
Effect of selection on Stated Trust and Risk.

	(1)	(2)	(3)	(4)	(5)
	Stated Trust General (Likert scale 1–10)	Stated Trust Family (Likert scale 1–10)	Stated Trust Village (Likert scale 1–10)	General risk (Likert scale 1–10)	Financial risk (Likert scale 1–10)
Selection Effect	−0.1981	0.6869*	0.385	0.1845	0.3054
	(0.4064)	(0.268)	(0.2807)	(0.4186)	(0.5325)
Constant	4.2121***	6.3131***	4.4192***	6.4798***	6.4848***
	(0.224)	(0.3461)	(0.3612)	(0.2915)	(0.3365)
Mean Effects	0.0852			0.0736	
Observations	341	341	341	341	341

Standard errors are in parentheses.
*** p < 0.01, ** p < 0.05, * p < 0.1.

Table 8
OLS results of relationship between structural and cognitive social capital (1).

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Amount sent by P1	Amount expected by P2	Amount sent by P1	Reciprocity US$6	Reciprocity US$12	Contribution to public good	Total contribution expected
Family members	0.5204	−0.0925	0.8396	0.2489**	−0.1872**	−1.8259***	−1.588
	(0.4583)	(0.4133)	(0.7973)	(0.0876)	(0.0623)	(0.192)	(2.3213)
Neighbors	−0.5318	0.2961	−1.3735***	0.1943	0.0929	−0.9475**	−3.9215
	(0.4634)	(0.5979)	(0.3378)	(0.0967)	(0.0573)	(0.309)	(1.9981)
Get together socially	0.0161	−0.0247	−0.3329	0.0317	0.031	0.1479	0.521
	(0.0607)	(0.1524)	(0.2975)	(0.0518)	(0.0354)	(0.1995)	(0.5382)
Attend the same church	−0.058	0.1596	0.5983	−0.0432	−0.0194	−0.1616	−0.4576
	(0.1548)	(0.1978)	(0.4958)	(0.0548)	(0.0421)	(0.3284)	(0.4117)
Buy or sell products or services with	−0.0199	−0.0456	0.231	−0.0196	−0.0103	−0.1051	−0.6121
	(0.0586)	(0.2348)	(0.1348)	(0.051)	(0.0391)	(0.1338)	(0.6324)
Employed at same farm or shop	−0.0762	−0.291	0.0575	−0.0912	−0.0745	−0.1565	0.5745
	(0.1749)	(0.3244)	(0.4189)	(0.0995)	(0.0613)	(0.2717)	(1.1017)
Work for	−0.0293	0.888	0.0788	0.2356**	0.1256	−0.1917*	1.0609
	(0.2205)	(0.5138)	(0.4162)	(0.0665)	(0.0839)	(0.0946)	(1.6397)
Member of the same producers' group	−0.0087	−0.1088	−0.099	0.0558	−0.0092	−0.2872	−0.5225
	(0.1138)	(0.1251)	(0.2825)	(0.0978)	(0.058)	(0.3398)	(0.8923)
Member of the same water user association	−0.0034	0.0231	1.3564***	0.0748	0.122	0.4694	1.3596
	(0.1552)	(0.4474)	(0.2634)	(0.1006)	(0.0828)	(0.4001)	(1.2307)
Attend parent-teacher association meetings with	−0.0291	−0.0239	−0.126	0.0119	0.008	0.1309	0.5893**
	(0.0624)	(0.1038)	(0.0998)	(0.0089)	(0.0304)	(0.1092)	(0.2133)
Seek advices from	0.1248	−0.3818	0.0299	0.2872*	0.3538**	0.2065	1.2836
	(0.3396)	(0.2329)	(0.5985)	(0.1184)	(0.0886)	(0.5024)	(1.8294)
Watch your children	2.6078*	1.3389	0.993	0.4773	0.5675*	0.1506	4.5627
	(1.0798)	(1.0144)	(1.7391)	(0.3524)	(0.2548)	(0.696)	(2.8926)
Exchange labor with	−0.4365	0.2661	−0.2745	−0.2225	−0.1132	0.5159	1.2772
	(0.498)	(0.3183)	(0.6263)	(0.1587)	(0.1238)	(0.3192)	(0.7168)
Constant	0.5204	−0.0925	0.8396	0.4545***	0.4286***	−1.8259***	−1.588
	(0.4583)	(0.4133)	(0.7973)	(0.0148)	(0.0167)	(0.192)	(2.3213)
Observations	341	341	341	341	341	341	341

Standard errors are in parentheses.
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

serve as predictors of trust, but there is no obvious relationship between structural and cognitive social capital.

Table 8 delves into the relationship between network measures and lab measures, with the former serving as explanatory variables. In these regressions, we leave the selected vs. control framework. As expected, a limited number of coefficients were statistically significant, suggesting that the structural dimension of social capital does not necessarily serve as a predictor of prosocial behaviors. Nonetheless, a few coefficients stand out as statistically significant.

Firstly, the results revealed that surveyed individuals tend to exhibit lower levels of pro-sociality when interacting with neighbors and family members. As the proportion of family members and neighbors increases, there appears to be a reduction in trust (the amount sent to members of the family and the second trustworthiness measure for neighbors) and a reduced willingness to contribute to the public good, although the supporting evidence is relatively weak (Table 8, columns 3, 6, and 7). Secondly, we observed heightened levels of pro-sociality when individuals engaged in reciprocal favor exchange. Notably, the coefficients for "seek advice from" were positive and statistically significant for both measures of trustworthiness. Additionally, the coefficients for "watched their children" demonstrate positive and significant relationships with the amount sent by P1 in the dictator game and

Table 9
OLS results of relationship between structural and cognitive social capital (2).

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Amount sent by P1	Expected amount by P2	Amount sent by P1	Reciprocity US$6	Reciprocity US$12	Contribution to public good	Total contribution expected
Number of groups to which the individual belongs to	0.001	0.018	−0.027	0.0077	0.0007	0.0113	0.0222
	(0.0143)	(0.0228)	(0.0199)	(0.0047)	(0.0031)	(0.0317)	(0.0528)
Number of close friends	0.0483	−0.0121	0.0391	0.0142	0.0212*	0.0336	0.286*
	(0.0326)	(0.0218)	(0.0215)	(0.0105)	(0.0097)	(0.0259)	(0.1258)
Can turn to people to ask for money	0.0017	−0.0406	0.0656**	0.0234***	0.0113	−0.0425	−0.1186
	(0.0343)	(0.0423)	(0.0207)	(0.0051)	(0.0097)	(0.0505)	(0.0651)
Interaction with groups outside their village	0.0691	0.0805*	−0.0401	−0.0181	−0.0126	0.0802	−0.2031
	(0.0364)	(0.0317)	(0.0321)	(0.0209)	(0.0137)	(0.0867)	(0.226)
Constant	1.7952***	1.8875***	2.0237***	0.3805***	0.4052***	2.6814***	7.795***
	(0.1161)	(0.1966)	(0.0876)	(0.0166)	(0.041)	(0.1161)	(0.7973)
Observations	341	341	341	341	341	341	341

Standard errors are in parentheses.
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

the second measure of trustworthiness. Working for others significantly increased the second measure of trustworthiness but reduced the contribution to public good. Finally, there seems to be an increase in trust among individuals who are part of the same water user associations. These findings support the notion that repeated interactions and reciprocal relationships can serve as indicators of trust. However, it is important to note that not all types of social ties lead to higher levels of prosocial behavior.

Table 9 shows correlations between lab-in-the-field measures and the SC-IQ measures of structural social capital. These variables relate to an individual's own networks in a broader context, i.e. they extend beyond the experimental session. These results reinforce our previous findings: there is no obvious relationship between structural and cognitive social capital. Having more close friends has a positive influence on the second measure of trustworthiness and on the total contribution expected in the PG. Awareness of being able to turn to members of the community to ask for money significantly increases the amount sent by P1 in the trust game and the first measure of trustworthiness, while more interactions with groups outside the village significantly increased the amount expected by P2 in the dictator game. However, it is worth noting that the magnitudes of these coefficients are relatively small.

To sum up, findings 1 to 3 show that selected individuals have a higher level of structural social capital than control individuals, findings 4 to 6 show that there are no significant differences in cognitive social capital between control and selected individuals, except for one of the experimental measures and one of the self-reported behavioral measures. Further, using a simple mean comparison, we show that what is attributed to trust could actually be due to other-regarding preferences such as altruism, unconditional kindness or guilt aversion. Finally, finding 7 shows that, in our sample, repeated interactions and reciprocal relationships can serve as predictors of trust, but there is no obvious relationship between structural and cognitive social capital.

In conclusion, findings 1 to 3 confirm H1, with the particularity of a higher bonding social capital observed in the control group. Findings 4 to 6 refute H2, whilst finding 7 refutes H3.

5. Discussion

1) Discussion of results

The role of social capital in community-based development (CBD) projects has been widely debated: do these projects rely on existing social capital, or do they actively generate it? While our study does not allow us to determine whether CBD projects create social capital, our findings provide evidence that they do rely on it. Grootaert and Van Bastelaer (2002) identified two key components of social capital: the structural component, which facilitates interactions among community members through established roles and social networks, and the cognitive component, which is characterized by shared norms, values, trust, attitudes, and beliefs.

Our findings revealed that selected beneficiaries of the NGO development program exhibited a higher level of structural social capital than non-beneficiaries. They had more social connections with other subjects from the experimental sessions and were members of more voluntary groups than the control individuals. This outcome suggests the presence of a selection bias, indicating that individuals with extensive social networks are more likely to be part of a VSLAs. This bias results from the agency's strategy of promoting the formation of VSLAs among individuals who already know and trust each other in order to enhance the project's likelihood of success.

Surprisingly, this observed selection bias in structural social capital did not correspond to differences in cognitive social capital between selected beneficiaries and non-beneficiaries. This contradicts the findings of authors such as O'Malley et al. (2012), Avdeenko and Gilligan (2015), McAvoy et al. (2020) and Su et al. (2022) who suggest that communities with denser social networks would exhibit higher levels of prosociality among their members. Our findings revealed no significant differences in pro-social behavior between beneficiairies and non-beneficiaries in lab-in-the-field experiments (except one measure of reciprocity).

We conducted further analyses to investigate the relationship between structural and cognitive social capital. Our results revealed few significant positive correlations between these measures and even some negative correlations, with the most notable heightened levels of prosociality observed when individuals engage in reciprocal favor exchange. Our results differ from those of Avdeenko and Gilligan (2015), who found that prosocial behavior increases along with the number of family members and friends in the experimental session. On the contrary, we found that an increase in the number of family members and neighbors decreases the contribution to the public good. Our results also differ from those of Binzel and Fehr (2013) as we do not find increased trust among friends (i.e., in our study, individuals who get socially together).

The fact that structural capital does not translate into more prosociality may be explained by two key factors. First, farmers face severe poverty, which is exacerbated by the negative impact of climate change on agricultural production in the region. These conditions can be at the origin of a reduced of pro-social behaviour (Nettle et al., 2011; Holland et al., 2012). Furthermore, this outcome could be attributed to the fact that most existing relationships do not primarily involve economic interactions. VSLAs, which entail monetary transactions, require a higher degree of trust, which may increase over time through repeated interactions and the establishment of economic ties, fostering trust, intimacy, and mutual concern (Sanyal, 2009).

The observed selection bias in structural social capital suggests the effectiveness of the agency's selection process in laying the groundwork for project success. However, since cognitive social capital is less observable, the assumption that higher structural social capital corresponds to higher cognitive social capital may be erroneous. Our findings concerning the absence of correlation between structural and cognitive social capital support this notion. This selection bias poses several challenges. Vulnerable individuals tend to invest less in social capital (Das, 2004), and evidence from microfinance projects suggests that access to microfinance primarily benefits existing businesses and relatively wealthier households (Banerjee, 2013). Thus emerges what we term the "social capital dilemma": while there is a need for a minimum level of social capital among members to guarantee that beneficiaries can work together (i.e. project success), selection criteria relying on social ties may undermine the equity goal of development project.

2) Policy recommendations

The identified selection bias is the results of development agencies' recruitment strategy, which results from a lack of prior information about the targeted population, and from the desire to improve projects' outcomes. This has an important policy implication regarding the inclusiveness of the recruitment strategies of development agencies. By targeting individuals with more social ties, development agencies risk excluding marginalized community members. In other words, the most marginalized members of targeted communities may not benefit from the programs, and the equity and inclusiveness goal of development programs may be missed. Furthermore, the lack of differences in terms of prosocial behaviors between selected beneficiaries and non-beneficiaries suggests that development agencies may not be implementing a strategy that successfully identifies individuals who trust each other and are able to cooperate from the get-go.

To face this bias, development agencies need to be more mindful of their selection procedures and be aware that they may be excluding less socially connected individuals. Using field data analysis could serve as a valuable tool in pursuing this objective and potentially minimize bias in the selection of beneficiaries (Roy, 2022). Through such data, agencies can either randomize the selection process or gain better insight into the

spectrum of socio-economic profiles within the targeted community and could ensure the inclusion of the most marginalized individuals.

Development agencies could also adjust their approach by no longer emphasizing the need for beneficiaries to already know and trust each other. Instead, they could begin projects with activities that create opportunities for social interactions and network building and strengthen trust. In the case of microfinance projects, like the one studied in this paper, development agencies could also consider providing collateral support for more marginalized individuals. This support could act as a "backup," reducing the perceived risk of other group members towards these individuals.

3) Limitations of the study

Several limitations characterize this work, such as the relatively small sample, the sometimes-difficult match between selected and control groups in local communities, and the potential selection bias intrinsic to our protocol. In fact, as participation in our experimental session was voluntary, our sample might not fully represent the local population (Attanasio et al., 2015). While this does not directly affect our measurement of selection effects due to our focus on establishing comparable control groups, we acknowledge that our reliance on existing social networks to recruit control participants may have introduced its own selection bias, despite our mitigation efforts.

Our study also faces external validity constraints. The research was limited to one district in Zimbabwe and focused solely on savings groups as a type of CBD project. Results may differ when examining other types of community-based development interventions across different contexts. The lack of correlation between structural and cognitive social capital (Finding 7) may be partly due to our relatively small sample size and the limited representativity of our sample, which is particularly relevant to this specific research question. Finally, while using different survey and incentivized tasks aimed to measure the multiple dimensions of social capital, it needs to be mentioned that we are not exhaustive in our measure of social capital. We tried to measure the most important dimensions, but we acknowledge that social capital is a complex, multifaceted concept that may include other relevant aspects we did not capture in our study.

6. Conclusion

Our research examined the structural and cognitive social capital levels of individuals who were about to participate in a Village Saving and Lending Associations (VSLAs) project in rural Zimbabwe (selected beneficiaries). We compared their levels of social capital with those of individuals from similar communities who would not participate in the project (non-beneficiaries). We showed that selected beneficiaries are more socially connected than non-beneficiaries, suggesting a selection bias. This indicates that being socially connected increases the likelihood of participating in CBD projects. However, the pro-social behaviour levels are similar between selected beneficiaries and non-beneficiaries. Additionally, we did not find significant correlation between cognitive and structural social capital measures.

An important methodological contribution of this work is the proposed protocol to measure social capital levels experimentally in disadvantaged rural communities. Measuring social capital is complex due to its multifaceted nature (Fitzsimons et al., 2019). Our method, based on surveys, stated preferences, and lab-in-the-field experiments, proved effective and yielded sound results, albeit with some challenges in implementation.

The next phase of this research involves revisiting the communities and VSLAs to conduct a second round of data collection with the same respondents to examine the evolution of both dimensions of social capital over time. Specifically, it would be valuable to investigate whether cognitive social capital has increased among beneficiaries over time, and whether VSLAs continue to exist beyond the end of the project. Future research should further explore the relationship between structural and cognitive social capital using a more representative sample and a more in-depth survey to map social networks and relationships and examine how these translate (or not) into cognitive social capital. Expanding the comparison to other projects and countries would also help strengthen the external validity of our findings.

Declaration of Generative AI and AI-assisted technologies in the writing process

During the preparation of this work the author(s) used ChatGpt in order to improve the clarity and quality of the English language. After using this tool/service, the author(s) reviewed and edited the content as needed and take(s) full responsibility for the content of the publication.

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CRediT authorship contribution statement

Amandine Belard: Writing – original draft, Methodology, Conceptualization, Software, Formal analysis, Project administration, Data curation, Validation, Investigation. **Stefano Farolfi:** Methodology, Writing – review & editing, Formal analysis, Software, Conceptualization, Investigation. **Damien Jourdain:** Funding acquisition, Project administration, Methodology, Writing – review & editing, Conceptualization. **Mark Manyanga:** Investigation, Writing – review & editing. **Tarisayi Pedzisa:** Investigation, Writing – review & editing. **Marc Willinger:** Conceptualization, Supervision, Methodology, Writing – review & editing.

Declaration of competing interest

The author declares that there is no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix 1–3. Supplementary data

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