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## RESEARCH ARTICLE

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# Social capital effects on resilience to food insecurity: Evidence from Kyrgyzstan

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**Abstract**

This paper investigates the role of social capital in terms of trust and group membership in building household resilience to food insecurity. Using detailed 'Life in Kyrgyzstan' multi-topic panel data, the research estimates resilience to food insecurity through the Resilience Index Measurement and Analysis (RIMA) approach, including different pillars and a resilience capacity index. The impact of social capital on resilience pillars and capacity is estimated using IV models for multiple endogenous variables. The results suggest that both trust and group membership positively affect resilience pillars and capacity.

**KEYWORDS**

food security, instrumental variable, resilience, social capital

## 1 | INTRODUCTION

Due to its possibility of conceptualizing household capacity for coping with shocks, the concept of resilience has become a cornerstone of policy interventions. In this respect, resilience thinking has already been embedded in socio-economic and environmental aspects of livelihood. This suggests that the concept of resilience has the potential to explain the behaviour of a system showing commensurate attention to social and economic changes. Practically, resilience describes the ability of socio-economic and ecological systems to transfer towards more sustainable states of development (Alexander, 2013). In developmental literature, the concept of resilience is largely discussed in the domains of food security (Ansah et al., 2019; Béné, 2020), agricultural sustainability (Shapiro-Garza et al., 2020), vulnerability (Miller et al., 2010; Sallu et al., 2010) and wellbeing (Beauchamp et al., 2021); however, there is limited research that considers social aspects in resilience discussions.

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Perhaps not as often considered is how social aspects of the environment manifest themselves in resilience. Looking at behavioural characteristics might provide better explanations by focusing on the convergence of social capital (Carpiano, 2007). By assuming an emergent property of the system, resilience is explained as the self-organising behaviour of the system (Gunderson, 2000). To function properly, the system should be able to absorb without any change or adapt to the new system. From this perspective, the concept characterises the combination of capacities (Béné et al., 2016), in which its effectiveness as a response mechanism should incorporate the elements of social capital (Sadri et al., 2018). More precisely, successfully coping with the consequences of shocks, adjusting changes and even creating a new system largely depend on social capital, enhancing the social fabric towards building and strengthening resilience.

To the best of my knowledge, this paper presents for the first time the role of social aspects in strengthening food insecurity resilience in Kyrgyzstan. Kyrgyzstan, home to 6.5 million people, is a landlocked country in which headcount poverty still remains high (WB, 2020). Among particularly susceptible households, vulnerability to poverty in the face of socio-economic and climatic shocks is particularly notable. Therefore, the country is still facing the menace of seasonal fluctuations in both poverty and vulnerability (Aidaraliev, 2017). Moreover, poor agricultural sector performance is common due to weak knowledge and limited access to resources, problems with markets or standards, and a high vulnerability to environmental issues (FAO, 2020). As the food security condition in Kyrgyz households is still precarious and unstable (Babu & Akramov, 2020), the prevalence of undernourishment is 7.1% (FAO, 2019a). As for resilience, Kyrgyz households are less resilient due to low social protection, limited access to credit, and low productivity, making them highly vulnerable and exposed to shock events (FAO, 2019b). In view of the rising awareness of building or strengthening resilience, it is absolutely critical to determine factors that may contribute to the development agenda in Kyrgyzstan.

Although there is a strong consensus among academics regarding the role of social capital in resilience, some findings have confirmed that certain forms of social capital may have a negative or insignificant association with resilience, explicitly reflecting a non-adapting mode of resilience or long-term food insecurity (Béné et al., 2016; Coulthard, 2011; Crookston et al., 2018). Therefore, the conceptualisation of resilience by integrating social capital should be extended, particularly in the context of developing countries. This study, analysing the relationship between social capital and resilience in Kyrgyzstan, a post-Soviet Central Asian country, may provide extra evidence for investigating the critical drivers of food insecurity resilience.

As for the measurement, there are two rival methods for operationalising resilience as household capacity to food insecurity: FAO's Resilience Index Measurement and Analysis (RIMA) and Technical Assistance to NGO's International (TANGO International) (Upton et al., 2022). The TANGO approach has integrated social capital into absorptive, adaptive and transformative capacities (d'Errico & Smith, 2019). Although the association between social capital and food insecurity resilience is empirically confirmed in the RIMA approach (Atara et al., 2020; d'Errico, Grazioli, & Pietrelli, 2018), the establishment of a causal relationship is rather limited. Therefore, there is another need to legitimately deduce a cause-and-effect relationship between these two phenomena. A further research gap is the limited focus on the practical insights in more rigorous analysis between social capital and resilience through its determinants. The mechanism explaining such a relationship is still limited for intervention policies that identify which dimension or determinant of resilience is likely to be influenced by social capital.

By taking the abovementioned gap into account, the paper contributes to the literature on food insecurity resilience from different perspectives. First of all, it uses nationally representative 'Life in Kyrgyzstan' (LiK) panel data, including the 2013 and 2016 waves, for the largely understudied Kyrgyzstan. Correspondingly, the LiK data includes individual, household, agriculture and community surveys over the waves, allowing for quantitative measurement of both social capital and resilience. By acknowledging one of the main dimensions of social capital, the composite score of both trust and group membership is obtained by using a data reduction technique of factor analysis. As for the dependent variable, the resilience capacity index (RCI) towards food insecurity is measured by different determinants/pillars under the RIMA approach. Accordingly, the RCI is constructed by factor analysis through the following pillars: income and food access (IFA), access to basic services (ABS), agricultural practices and technologies (APT) and

adaptive capacity (AC) (Alinovi et al., 2008). As a latent variable, each pillar itself is also obtained by factor analysis. In order to identify the mechanism explaining how social capital affects resilience and its pillars, each pillar is included as a dependent variable.

The estimation strategy between social capital and resilience does not assume that there is an instantaneous effect in which the RCI or a pillar is time- and event-dependent. Therefore, this paper proposes an empirical strategy to analyse the effect of social capital in time  $t$  on resilience or pillar outcomes in time  $t + 1$ . Due to a theoretical foundation and data availability, it was possible to adopt an instrumental variable (IV) approach for detecting the causal effects of social capital on RCI and related pillars IFA, ABS and APT, as well as AC. In order to identify the IV approach, IVs such as the existence of mosques/churches in the community and the number of groups in the community are used for endogenous trust and group membership variables, respectively. An empirical strategy is based on two-stage least squares (2SLS) and the IV structural equation model (IV-SEM) to explore the causal effects in the presence of multiple endogenous variables. The findings generally confirm that both trust and group membership positively affect IFA, APT, AC and the RCI itself.

## 2 | REVIEW OF RELEVANT LITERATURE

### 2.1 | Social capital

The discussions surrounding social capital and its role in development studies have already reached exponential growth in research. Like physical and human capital, the arguments about the socio-cultural roles of both individuals and society in the last decade have given a stronger impetus to also include the role of social capital. Social capital, which is relatively less tangible or absolutely intangible, represents the relationships among people in society. The term social capital refers to general or specific characteristics of society representing trust, norms and networking under facilitated and coordinated accomplishments (Putnam et al., 1994). Generally, social capital refers to social trust, willingness to cooperate, group membership and participation (Macinko & Starfield, 2001). Considering a multivariate model in analysing neighbourhood characteristics, social capital is divided into different dimensions comprising collective efficacy, local networking, organisation involvement and conducting norms (Sampson & Graif, 2009). For example, Carpiano and Hystad (2011) have used membership and participation in different groups, while Cramm et al. (2012) have focused on neighbourhood group membership to represent social capital. Musalia (2016) has used a challenging and invigorating methodology by using trust in the community to represent cognitive social capital. Trust in social capital is strongly accentuated since it also shows linking as a third topology of social capital, in which people are likely to interact across explicit, formal or institutionalised power or authority in society (Moore & Kawachi, 2017).

### 2.2 | Social capital and resilience

The concept of resilience was discussed by Holling (1973), who proposed the persistence of relationships within a system. Accordingly, a system is recognised as persistent or resilient when it is able to absorb changes. Moreover, resilience is recognised as the flexibility and ability of the system to adapt to regular disturbances (Nelson et al., 2007); therefore, it is theoretically discussed as a way of 'bouncing back' from endogenous and exogenous shocks (Skerratt, 2013). Another important element of resilience was added by Walker et al. (2004), proposing a transformation in resilience. Transformability enables a social, economic, ecological or political environment to create the system when the existing condition does not function. In socio-ecological systems, resilience has a buffering capacity to withstand shocks so that households are able to properly maintain their functioning (Folke, 2006). In this

perspective, resilience should provide the ability to self-organise, explained by the magnitude of tolerance to disturbances (Carpenter et al., 2001).

Although the relationship between social capital and resilience is not unidirectional, the establishment of resilience capacity strongly depends on human empowerment by collective actions or social dynamisms (Fischer & McKee, 2017; Hayward, 2013). In resilience thinking, social capital therefore manifests itself as a plausible factor to strengthen resilience (Aldrich & Meyer, 2014). More precisely, Wang et al. (2021) have confirmed a positive relationship between social networks and livelihood resilience. In this respect, building inter-community relationships in rural areas leads to stronger resilience. In the presence of shocks, the level of social networking is linked with a transformation capacity when farmers face a system of change (Sinclair et al., 2014). As a long-term response to socio-economic or environmental changes, building trust and cooperation is reflected in strengthening the AC (Folke et al., 2005). Respectively, strong ties characterise the ability of farmers to respond to changing conditions by activating and exchanging strategies within networks (Castaing, 2021). In Kyrgyzstan, as a transition country, social capital plays a crucial role in building resilience. Social capital components such as trust and networking may not have the same direction because building them depends on the level of state control over society (Radnitz et al., 2009). Therefore, similar situations have created an adaptive mechanism through building networks that ameliorate socio-economic adversity (Schwanbeck, 2020). As for rural areas in Kyrgyzstan, strengthening the AC to climate change through social capital has already proven to provide successful results (Ashley et al., 2016). Since remittance is one of the most effective ways to reduce the risk of exposure to shocks (Roberts & Moshes, 2016), social remittances entailing the transmission of social capital to the sending-country community are also particularly important (Ivlevs et al., 2019). In addition to this, strengthening social capital through an additional migrant network may stimulate food insecurity resilience (Fan et al., 2014). Therefore, paying particular attention to the local forms of social capital is critical in order to build or strengthen the resilience of Kyrgyz households.

Looking at the sources of resilience within a system, social capital makes substantial inroads into the conceptualisation of household resilience and food security outcomes (Alinovi et al., 2008; Alinovi et al., 2010; Atara et al., 2020; Egamberdiev et al., 2023). Following this, Conostas et al. (2020) have provided harmonised metrics under the core indicators for resilience analysis approach, in which social capital gained prominence as an enabling capacity to minimise the effect of shocks. Furthermore, and pertinent to this approach, the development of the resilience causal framework by the resilience measurement technical working group (RM TWG) integrates social capital as one of the most important components of resilience since it articulates the relationship or interaction in the process of recovering from a shock (Mock et al., 2015). Within the same conceptual approach, d'Errico, Grazioli, and Pietrelli (2018) have advanced the relationship between social capital, constructed through the perception of social inclusion in the decision-making process and local service provision and resilience. Accordingly, empirical findings have confirmed a positive effect of social capital on resilience capacity and food security. Another seminal contribution uses the bonding, bridging and linking dimensions of social capital to construct a resilience index towards food insecurity (Smith & Frankenberger, 2018). Therefore, the association between social capital and food insecurity resilience, particularly in the RIMA approach, is a promising line of research. Since the majority of discussions are based on the relationship between social capital and food insecurity resilience through a factor score or weighted sum of the items, empirical estimations for causal relationships are still needed.

### 3 | DATA AND METHODOLOGY

#### 3.1 | Data

'Life in Kyrgyzstan' (LiK) is a longitudinal survey of households and individuals that includes 3000 households and 8000 individuals over time in seven regions (oblasts) and two cities (North/South, rural/urban) of Kyrgyzstan. The survey was established as a part of the 'Economic Transformation, Household Behavior and Well-Being in Central

Asia: The Case of Kyrgyzstan' project, a collaboration of DIW Berlin, Humboldt-University of Berlin, the Center for Social and Economic Research (CASE-Kyrgyzstan) and the American University of Central Asia. Representative at national and regional levels, the survey covers different topics related to household demographics, well-being, health, migration, agriculture, shocks and many others (Brück et al., 2014). The survey, consisting of six waves, was conducted for the period from 2010 to 2016, tracking the same individuals and households over the waves. The most agricultural-specific section of LiK was additionally included in the wave of 2016, providing a unique opportunity to study agriculture at a household level. Correspondingly, the paper uses both the 2013 and 2016 waves due to their relevance to the scope of the study.

### 3.2 | Estimating resilience and social capital

One comprehensive approach to constructing the index is based on the components of resilience. This method was later formalised as RIMA for food security outcomes (FAO, 2016). The estimation framework for constructing resilience should consider following these analytical principles: (i) resilience has a nature of multidimensionality; (ii) resilience is a latent or unobserved variable; and (iii) resilience is a constructed index (d'Errico et al., 2016).

The choice of the variables adopted for constructing the IFA, ABS, APT and AC pillars together with the RCI is based on literature findings, country context and factorability statistics (see Table A1 in the Online Appendix). The RIMA approach embodies the abovementioned principles by constructing a capacity index under multidimensional latent characteristics. In this paper, the RCI for household  $h$  is expressed by four pillars:

$$RCI_h = f(IFA_h, ABS_h, APT_h, AC_h) \quad (1)$$

As long as any of these variables is not directly observable, an appropriate method is to apply principal component analysis (PCA) in order to identify the structures within a set of possibly correlated observable variables in a smaller set of uncorrelated ones. Alinovi et al. (2010) have proposed a similar technique with a weighted scoring method for constructing pillars and the RCI itself. By using PCA, the paper uses the Bartlett weighting method (Bartlett, 1937) to produce a latent variable for pillars and RCI. In order to ease the interpretation of regression findings, a min-max rescaling approach was applied.

To define the number of factors to be retained with the eigenvalue, it is considered a value with a minimum of 1 (Kaiser's criterion). The value indicates how much of the total variance over the items can be explained by the factor (Acock, 2010). Accordingly, factors retained with Kaiser's criterion were further interpreted by the loadings of variables (association to the underlying factor), which should be more than a minimum of 0.30. The paper used the varimax rotation technique by maximising the dispersion of loading within the obtained factors (Field, 2013). In order to check correlations between the selected variables in the factor, a Kaiser–Meyer–Olkin (KMO) test was used, in which only items above the threshold level of 0.50 were considered (Kaiser, 1974). Bartlett's test of sphericity was also applied by checking whether a matrix was significantly different from an identity matrix (Field, 2013). Accordingly, a test of significance at 1% was applied, indicating that variables are suitable for factor analysis with enough covariance. Lastly, the multicollinearity was checked by the determinant of R-matrix, which should be higher than 0.00001 (Field, 2013). Table A2 in the Online Appendix presents factorability details on pillars and RCI.

Independent variables of trust and group membership were constructed by using relevant observed variables (see Table A3 in the Online Appendix). Each variable is based on the perception of respondents, who were asked to agree with statements representing the characteristics of the neighbourhood. Since social capital is embedded in a multidimensional structure, its composite score in socio-economics has been found to be promising (Narayan & Cassidy, 2001). Therefore, both trust and group membership are obtained by PCA. Table A2 in the Online Appendix provides factorability details for both trust and membership. The order of the questions was reversed in order to

maintain the same direction with the scales. In trust measurement, respondents were asked about their perception of the level of trust in the neighbourhood based on a 4-point Likert scale (1: strongly disagree; 4: strongly agree). There are six item questions to represent the level of trust in the community. As for the construction of group membership, there are 12 item questions representing whether a respondent has belonged to the corresponding group during the last 12 months.

Resilience as capacity implies that pillars should support a positive shift in the likelihood function if shocks intensify; therefore, a measurement of resilience over the course of an actual period of shock exposure is required (d'Errico & Smith, 2019). Accordingly, the paper includes 25 types of multi-level shocks from the household dataset to provide an appropriate and independent metric towards food insecurity resilience. By covering socio-economic and environmental aspects, idiosyncratic (small-scale) and covariate (large-scale) shocks from both household and community surveys of LiK are included (see Table A4 in the Online Appendix). In the estimation, a household stability index and a community stability index were measured through PCA from rescaled shocks experienced over the last 12 months (assuming a value of 0 for experiencing or 1 for not experiencing the shock to represent stability). In the construction of the RCI, the household stability index was included as one of the defining variables of AC (Alinovi et al., 2009; Alinovi et al., 2010). Since the RCI is measured at household level, the Community Stability Index, representing 14 types of shocks from the community-level dataset, was included as a controlling variable in further regression models.

### 3.3 | Instrumental identification strategy

In the epidemiological literature, a zero-time lag between exposure and outcome provides implausible explanations (Blakely & Woodward, 2000). Considering causal pathways, a cross-sectional design may not provide a true picture of neighbourhood effects (Macintyre et al., 2002). Accordingly, any transformation in the social characteristics of the neighbourhood does not reflect a change in human behaviour or socio-economic life at the same time or within a short period of time. Instead, a change in household resilience is recognised as the result of cumulative exposure over several years. Therefore, there should be more fervent attempts to analyse how social capital in a time period  $t$  is associated with resilience outcomes in the future, or  $t + 1$  period. A similar approach was supported by the authors' conceptualisation of the role of resilience for food security outcomes (d'Errico & Pietrelli, 2017; d'Errico, Romano, & Pietrelli, 2018; FAO, 2016).

To ensuring a variation of social capital in resilience outcomes, the main objective is to understand how trust and group membership in 2013 are likely to influence both pillars and RCI in 2016. The conceptual framework for the relationship is:

$$\text{Pillars/RCI}_h = \beta_0 + \beta_1 \text{Trust}_h + \beta_2 \text{Group Membership}_h + \beta_3 X_h + u_h \quad (2)$$

in which  $h$  = household; *Trust* and *Group Membership* are constructed variables representing the social capitals of a neighbourhood;  $X$  describes household and community characteristics (see Table A1 in the Online Appendix). Most probably, trust and membership are endogenous and correlated with the error term. Therefore, OLS estimators are likely to be inconsistent due to the problem of endogeneity. One of the broad approaches to correcting endogeneity is applying the IV approach to the regression model (Wooldridge, 2010). Due to the existence of endogeneity in Equation (2), I instrumented it with related variables represented by the vector  $Z_h$ .

$$\text{Trust}_h = \gamma_0 + \gamma_1 Z_{1h} + \gamma_2 X_h + v_h \quad (3)$$

$$\text{Group Membership}_h = \eta_0 + \eta_1 Z_{2h} + \eta_2 X_h + \omega_h. \quad (4)$$



In this case, I adopted IV by using the variables existence of mosques/churches in the community for trust and number of groups in the community for group membership. In terms of exclusion restriction, the relationship between the existence of mosques/churches or the number of groups in the community and resilience is mostly realised through trust or group membership. Since social interaction within homogenous groups is inextricably linked with religious membership (Vikram, 2018), the presence of religious organisations is used to measure social capital (Harrison et al., 2019; Rupasingha & Goetz, 2008). Although the existence of a mosque or church does not represent a true congregation, it is an indirect way to understand religious attendance. Such prevalence of participation in a group increases the sense of belonging (Carpiano & Hystad, 2011); as a result, people are likely to provide financial, economic or social support to members of the groups in which they identify themselves as members (Wakefield et al., 2017). This is particularly important for post-Soviet Central Asian countries like Kyrgyzstan, since exchanging information or strengthening group identity is established in unofficial organisations located in 'mahalla' (Dadabaev, 2017). According to this, mahalla, referring to a community group, may provide mutual support termed 'khashar' in most Central Asian countries. In this respect, building social networks through available mosques/churches or community organisations is the first outcome. Consequently, it enables the creation of strong bonds and ties within the group that can bring additional social, economic or political resources to build or strengthen resilience. For example, findings have confirmed that the expansion of social support is strongly linked with the social ties available in congregational membership, in which members activate support mechanisms when dealing with shocks. (Idler et al., 2003).

In order to implement the IV approach, 2SLS estimation was used. This model estimation is practically useful when one or more of the regressors are found to be endogenous. The causal estimation is obtained in the second-stage regression in Equation (2), including predicted values of endogenous regressors through instruments in Equations (3) and (4). Table A5 in the Online Appendix provides the first-stage results of IV for both instruments. In highly complex relationships, simultaneous equation modelling also allows for implementing the IV approach (Wooldridge, 2010). Practically, it has been applied through a structural equation model (SEM), which can be another major application for implementing IVs in the presence of the problem of endogeneity (Bollen, 1996). In this case, a promising method is to use maximum likelihood (ML) estimation for SEM to implement the IV approach (IV-SEM) by drawing causal inferences on the model (Grace, 2021). Accordingly, IV-SEM made it possible to use covariance procedures by modelling endogenous covariance directly (see Figure A1 in the Online Appendix). In this case, Maydeu-Olivares et al. (2019) have confirmed that both 2SLS and IV-SEM provide accurate coverage rates in the presence of endogeneity if the sample size is bigger than 500 observations. As long as 2SLS is practically susceptible under the weak instrument assumption, IV-SEM allowing nonlinear estimation is robust (Meyer et al., 2016). In addition to the 2SLS and IV-SEM models, a two-stage regression model was regressed manually with a bootstrapping method. It allows standard errors to be fixed by resampling from the sample in statistical inferences (Cameron & Trivedi, 2009). For assessing the goodness-of-fit in IV-SEM, decisions were generally based on extended statistical information. Fit statistics cover the likelihood ratio chi-square test, root mean squared error of approximation (RMSEA), standardised root mean squared residual (SRMR) and comparative fit index (CFI) for estimating the appropriateness of SEM (Acocck, 2013). An identification assumption for one endogenous regressor depends on Cragg-Donald statistics (Cragg & Donald, 1993). Due to the existence of multiple endogenous covariates, the identification of weak instruments is notoriously challenging. Although there is no consensus for using any exact type of test for weak instrument identifications in the presence of multiple endogenous regressors, the decision is based on Sanderson-Windmeijer statistics (Sanderson & Windmeijer, 2016).

## 4 | RESULTS

Table 1 shows the relationship between trust and group membership, with IFA outcomes for all models. Tables A6–A8 in the Online Appendix show the second-step results, including the controlling variables. Although the magnitude



**TABLE 1** Impact of trust and group membership on IFA and ABS: IV-SEM and 2SLS second-stage results.

	Income and food access (IFA)			Access to basic services (ABS)		
	(1) IV-SEM	(2) 2SLS bootstrap	(3) 2SLS	(4) IV-SEM	(5) 2SLS bootstrap	(6) 2SLS
Trust	1.359** (0.532)	1.198*** (0.282)	1.146** (0.474)	0.541* (0.298)	0.666*** (0.188)	0.423 (0.377)
Group membership	1.525* (0.833)	1.610** (0.787)	3.436*** (1.289)	-4.491*** (1.053)	-4.626*** (0.561)	-3.724*** (1.061)
Observations	1782	2218	1782	1814	2259	1814
R squared	0.301	0.213	-	0.223	0.077	-
Chi-square	15.073	-	-	16.150	-	-
p-value	0.002	-	-	0.001	-	-
RMSEA	0.048	-	-	0.049	-	-
CFI	0.982	-	-	0.971	-	-
SRMR	0.009	-	-	0.010	-	-

*Note:* Standard errors in parentheses. Household and community controls: head age, head female, head married, head education, household size and community stability index. Regional dummies: Issyk-Kul and the Tian Shan; Ferghana Valley; and Bishkek and the Northwest. The excluded dummy is Bishkek and the Northwest.

Abbreviations: 2SLS, two-stage least squares; CFI, comparative fit index; IV-SEM, instrumental variable structural equation model; RMSEA, root mean squared error of approximation; SRMR, standardised root mean squared residual.

\*\*\* $p < 0.01$ . \*\* $p < 0.05$ . \* $p < 0.1$ .

of the impact of the group membership index is relatively high in the 2SLS model (column 3), findings generally confirm that an improvement in IFA is due to a point index rise in both social capital indexes.

Since IFA is constructed through food security indicators, the findings are still relevant to the results explaining the relationship between social capital and food security outcomes. The effect of food security is mainly driven by Factor-1, where coefficients of variables are higher than 0.5 (see Figure A2 in the Online Appendix). Generally, social capital is inherently linked with defining food security (Dzanja et al., 2015; Leddy et al., 2020) or nutritional outcomes (Vikram, 2018), in which different aspects of social capital such as social support, social cohesion, social control and social participation are deeply connected with a positive status of food security (King, 2017). As for a dynamic change in food security outcomes, social capital did emerge as a potential factor to promote food security, where one can observe the transition from food insecurity to food security status (Paul et al., 2019). Another remarkable finding for the relationship between social capital and IFA confirms the role of social capital for income from agriculture, benefits and remittances since they have noticeable contributions to building Factor 1 and Factor 3 (see Figure A2 in the Online Appendix). In this case, a potential explanation is that household members dependent on income from agriculture and social benefits are likely to migrate and activate additional sources for their livelihoods. It is noteworthy that the existing literature also shows strong ties between social capital and remittances (Eckstein, 2010), in which remittance-recipient countries noticeably benefit from remittances to build growth under strong social capital elements (Borja, 2014). Although there is a positive relationship between the trust index and ABS (columns 4 and 5), the relationship between group membership and ABS is negative in all outcomes. This may be the result of using certain variables to represent community characteristics. For example, the generated Factor 1 and Factor 3 generally characterise the distance from households to community destinations (see Figure A3 in the Online Appendix). In this respect, social capital does not always echo the condition of community infrastructure development (McShane, 2006), especially in the presence of long-lasting disturbances (Ledogar & Fleming, 2008). A positive relationship between the trust index and ABS is clearly detected in the IV-SEM and 2SLS models (columns 4 and 5).

As for the outcome of APT in column 1 of Table 2, both social capital indicators positively affect APT. The magnitude of impact is higher in IV-SEM for trust (column 1) and in 2SLS for group membership (column 3). Current literature discussions are successfully showing the relationship between social capital and agricultural development (Munasib & Jordan, 2011; Rivera et al., 2019). Such a relationship is presumably driven by the addition of livestock and crop production in Factor 1 for strengthening APT (see Figure A4 in the Online Appendix). As expected, there are positive relationships between both social capital variables and AC. The improvement of AC in column 6 is relatively high for each index rise in group membership. The ability to engage in community organisations was found to be a potential precursor to building household resilience through strengthening AC (Bernier, 2014). In the presence of weak formal institutions in less developed economies, social capital plays a major role by promoting networks (Fafchamps, 2006). This situation is very much applicable in our findings, with the informal networking index as one of the determining factors of AC (see Figure A5 in the Online Appendix). A plausible explanation is that trust or membership accommodates the peculiarities of unofficial networking for building AC. In this case, households are likely to adapt by activating informal networking channels to have access to transfers in the presence of higher social capital values (Paldam, 2000). Moreover, the presence of trust and membership is likely to strongly empower AC with weather information and extension services (see Figure A5 in the Online Appendix). Less progress in government policies may encourage farmers to strengthen their relationships (Pretty & Ward, 2001), which is particularly strongly reflected in the relationship with heterogeneous groups such as extension officers or advisors (Cofré-Bravo et al., 2019).

Table 3 shows the effect of trust and membership on RCI. There is a positive and significant effect under all types of models. As discussed above, the magnitude of the relationship between group membership and RCI under the 2SLS model (column 3) is relatively high. Studies have confirmed a positive relationship between social capital and resilience (Aldrich & Meyer, 2014; Carrico et al., 2019), where the social network and trust were found to be promising ways to influence resilience (Carmen et al., 2022). This relationship confirms that building household resilience towards food insecurity is a multifaceted social process.

**TABLE 2** Impact of trust and group membership on APT and AC: IV-SEM and 2SLS second-stage results.

	Agricultural practices and technologies (APT)			Adaptive capacity (AC)		
	(1) IV-SEM	(2) 2SLS bootstrap	(3) 2SLS	(4) IV-SEM	(5) 2SLS bootstrap	(6) 2SLS
Trust	1.222** (0.486)	1.028*** (0.310)	1.038** (0.466)	0.529*** (0.198)	0.475*** (0.105)	0.443** (0.187)
Group membership	2.362*** (0.904)	3.116*** (0.832)	4.196*** (1.344)	0.886*** (0.319)	0.898*** (0.294)	1.696*** (0.530)
Observations	1821	2269	1821	1813	2257	1813
R squared	0.351	0.317	-	0.359	0.277	-
Chi-square	16.579	-	-	16.094	-	-
p-value	0.001	-	-	0.001	-	-
RMSEA	0.050	-	-	0.049	-	-
CFI	0.984	-	-	0.984	-	-
SRMR	0.010	-	-	0.010	-	-

*Note:* Standard errors in parentheses. Household and community controls: head age, head female, head married, head education, household size and community stability index. Regional dummies: Issyk-Kul and the Tian Shan; Ferghana valley; and Bishkek and the Northwest. The excluded dummy is Bishkek and the Northwest.

Abbreviations: 2SLS, two-stage least squares; CFI, comparative fit index; IV-SEM, instrumental variable structural equation model; RMSEA, root mean squared error of approximation; SRMR, standardised root mean squared residual.

\*\*\* $p < 0.01$ . \*\* $p < 0.05$ . \* $p < 0.1$ .

**TABLE 3** Impact of trust and group membership on RCI: IV-SEM and 2SLS second-stage results.

	Resilience capacity index (RCI)		
	(1) IV-SEM	(2) 2SLS bootstrap	(3) 2SLS
Trust	1.026*** (0.356)	0.878*** (0.156)	0.862*** (0.315)
Group membership	0.965** (0.459)	1.157*** (0.389)	2.372*** (0.841)
Observations	1777	2210	1777
R squared	0.397	0.352	-
Chi-square	14.622	-	-
p-value	0.002	-	-
RMSEA	0.047	-	-
CFI	0.988	-	-
SRMR	0.009	-	-

*Note:* Standard errors in parentheses. Household and community controls: head age, head female, head married, head education, household size and community stability index. Regional dummies: Issyk-Kul and the Tian Shan; Ferghana valley; and Bishkek and the Northwest. The excluded dummy is Bishkek and the Northwest.

Abbreviations: 2SLS, two-stage least squares; CFI, comparative fit index; IV-SEM, instrumental variable structural equation model; RMSEA, root mean squared error of approximation; SRMR, standardised root mean squared residual.

\*\*\* $p < 0.01$ . \*\* $p < 0.05$ . \* $p < 0.1$ .

As for the controlling variables provided in Tables A6–A8 in the Online Appendix, household head age, household size and stability in the community generally translate into improved pillars and RCI. However, a reverse relationship is true for head female households, where IFA, ABS and RCI outcomes are negative. This negative relationship might be due to gender roles in agriculture and food security (Malapit & Quisumbing, 2015; Sraconi et al., 2014). A negative relationship between head education and the pillars or RCI is not very conclusive since the outcome of ABS is positive. In this case, the potentially negative effects of education could be hidden by the fact that the experience in agriculture of the household head is not taken into account in the models.

## 5 | CONCLUSION

It is possible to conclude that the heuristic indexed trust and group membership indicators in the paper are able to capture an unobservable construct of neighbourhood social capital. In this respect, the empirical approach is quite amenable to the expansion of the theory in relation to social capital and resilience, especially resilience to food insecurity. As many papers are limited in terms of building the role of social capital in the cross-sectional design (Macintyre et al., 2002), dealing with a zero time lag between exposure and outcomes has become one of the more challenging tasks in research (Blakely & Woodward, 2000). In this respect, a plausible explanation for the impact of trust and group membership in 2013 on the outcomes of pillars and RCI in 2016 is not likely to be instantaneous but rather a long-term effect. Specifically, this paper contributes to the literature on resilience to food insecurity measurement through RIMA (see Figure A6 in the Online Appendix) by providing empirical evidence of the impact of trust and group membership. In particular, both trust and membership are likely to improve IFA, APT, AC and RCI. In the case of ABS, group membership is not associated with improvement. Generally, the findings are coherent with other discussions showing the association between social capital and resilience capacity (d'Errico, Grazioli, & Pietrelli, 2018). Moreover, the results are congruent with the idea that the role of social capital in the conceptualisation of resilience should be measured and integrated into the resilience approach (Maxwell et al., 2015).

Since social capital approaches are likely to provide important leverage in resilience thinking, building household resilience to food insecurity should go beyond interventions focusing simply on food security outcomes. It is crucially important to consider trust and membership as potential for improving income and access to food security. Future target policies should pay attention to livelihood-related infrastructure in which mitigating activities from shocks can be realised on a household level. The presence of trust in the community may provide an additional margin to enhance household resilience when access to community services is improved. Moreover, interventions should recognise the role of networks that can serve as a basis for adaptive coping strategies. This finding, accentuating the importance of trust in the community and membership in different organisations, explains how households adapt and organise themselves through unofficial channels. Meanwhile, state support for weather forecasting and extension services is needed, as it may improve dissemination mechanisms for enhancing adaptive strategies. Further support of social capital in Kyrgyzstan will shape policy effectiveness in formulating the development of livestock and crop productions that may have a spurring effect on building resilience capacity.

I conceptualised the relationship between social capital and resilience, keeping in mind some related limitations. As long as a study focuses on quantified characteristics of resilience, self-perceived or subjective measures of resilience may provide complementary guidance in understanding household resilience and food security. Studies measuring household resilience through subjective measures, for example, have helped to show the importance of resilience through cognitive and self-evaluation capacities (Béné et al., 2019; Crookston et al., 2018). As information about shocks is collected from self-reported subjective responses, there is probably a low accuracy of the information, because respondents may overestimate or underestimate different types of shocks. A similar problem for analysing the relationship between shocks and food security is raised by d'Errico, Grazioli, and Pietrelli (2018). In addition to this, high-shock experiencing households in the previous year might be characterised by activating coping strategies in order to balance their livelihood. A strong coping strategy and mechanism during a high-shock period may have a positive impact on both resilience and food security outcomes (Lascano Galarza, 2020). Therefore, further studies should take the role of shocks in resilience studies into account, including exogenously estimated shock events. As long as power relations in the household shape social aspects, findings can be improved if gender roles are considered when analysing the relationship between social capital and resilience. For this reason, further attempts should recognise the exclusiveness of power relations. Another major limitation is that the findings did not cover the strength of local institutions and organisations, which is a very regional-specific aspect. Although people are intricately linked with community organisations, it should be considered which organisations or institutions perform in the community, including their different functions and their varying quality. Since there is a pervasive Soviet-based notion of 'does not bother, does not help' when it comes to the relationships of societal actors, this kind of societal stigma is also likely to produce controversial results for an analysis of relationships when building resilience.

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## DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the International Data Service Center of the Institute for Study. Restrictions apply to the availability of these data, which were used under license for this study. Data are available from <https://datasets.iza.org/dataset/124/life-in-kyrgyzstan-panel-study-2013>.

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

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