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Food security among low-income immigrant households and the role of social capital: A case study of Somali-American households in the Midwestern United States

Harshada Karnik *, Hikaru Hanawa Peterson

Department of Applied Economics, University of Minnesota, United States

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ABSTRACT

Through analysis of primary data from 249 Somali American households in seven cities in the Midwestern United States, we present a case study, which reviews non-monetary constraints to food security, assesses food security and social capital in a low-income immigrant community, and estimates the relationship between food security and social capital. We measure social capital objectively as the size of the Somali American community in the urban center, while subjective (self-reported) measures of social capital include the respondents' perception of support received from their community, interactions with members of their community, and membership in organized groups. Results confirm low levels of food security in Somali American population, a community that cannot be readily studied using secondary data such as the Current Population Survey due to the limited sample size. However, we find a positive association between objectively measured social capital and food security indicating higher levels of food security among respondents in larger Somali American communities within the study area. Association of food security with two self-reported measures (perceived community support and informal interactions) was inconclusive. The relationship between food security and the third self-reported measure (participation in organized groups) was not statistically significant.

1. Introduction

In 2021, almost 90 % of households in the United States (U.S.) were food secure, i.e., they had access at all times to enough food for an active healthy life (Economic Research Service, 2023). The remaining 13.5 million U.S. households (10 % of the non-institutionalized civilian population) were food insecure, with lower food security rates documented for single-parent households, Black- and Hispanic-headed households, and low-income households (Coleman-Jensen et al., 2022). Immigrant households also experience lower food security than their native-born counterparts (Hadley et al., 2007; Hadley and Sellen, 2006; Kasper et al., 2000; Mansour et al., 2021, 2020; Weigel et al., 2007). Studies have pointed out instances of children with non-English-proficient or immigrant parents being less likely to be food secure compared to children born to English-proficient or native-born parents (Capps et al., 2009; Chilton et al., 2009; Quandt et al., 2006). Substantial resources such as the Supplemental Nutrition Assistance Program (SNAP) have been devoted to resolving evident monetary constraints, while non-monetary barriers that immigrant households face have not received as much attention.

In this case study of the Somali American community in the U.S. Midwest, we first review non-monetary barriers to food security and different dimensions of social capital, i.e., benefits incurred from the exchange of information and other intangible non-monetary support offered within an individual's social network or cultural community.[1] Then, we examine the relationship between social capital and food security.

Several studies have used qualitative methods to study the relationship between food security and social capital. These studies examined the informal mechanisms used by low-income households to enhance food security and highlighted the importance of life skills such as creating a personal support system and gaining knowledge of

* Corresponding author.
E-mail address: harshada@umn.edu (H. Karnik).

[1] There is no consensus among scholars on the definition of social capital. Durlauf and Fafchamps (2005) offer an overview of the concept and its evolution in the *Handbook of Economic Growth*. Our definition is most similar to Lin (2002) who defines social capital as "*resources embedded in social networks and accessed and used by actors for actions*" and Just (2013) who defines it as "*durable social relationships one has and can draw upon as resources for goods – tangible, emotional or informational*".

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community resources (Sano et al., 2011; Swanson et al., 2008). Some quantitative research, predominantly based on samples of native-born populations, found a correlation between social capital and food security (Martin et al., 2004; Mokari-Yamchi et al., 2020; Niles et al., 2021; Swanson et al., 2008; Walker et al., 2007). Other studies found no significant association between social capital and food security (Garasky et al., 2006; Kirkpatrick and Tarasuk, 2010; Lamidi, 2019; Morton et al., 2005). These studies nonetheless highlighted instances of food shared between families (Garasky et al., 2006) and higher odds of being food secure when community responses to food-related problems were perceived to be adequate (Morton et al., 2005).

Our main contribution is the measurement and analysis of food security in the Somali-American population in the Midwestern U.S., a low-income immigrant community that is not well-represented in nationally representative secondary datasets such as the Current Population Survey and thus cannot be easily studied due to small sample sizes. Marked differences across immigrant populations, and the communities in which they settle, render case study an appropriate method for this analysis. We consider several measurements of social capital, unlike the previous studies on the topic, which help to clarify the nuanced nature of social capital fostered in the study community. Our findings highlight the role of social capital in enhancing food security among immigrant households while raising concerns about applying the current food security measurement to immigrant and refugee households.

Our findings confirmed a low degree of food security and limited reliance on community resources such as emergency food assistance in the study community. We also found that not all dimensions of social capital had similar relationships with food security outcomes. Social capital measured objectively as the size of the Somali American population in the urban center had a significant, positive impact on food security, and subjective or self-reported measures of social capital such as perceived community support and informal interaction with community members had a small but significant impact on food security in the study community in some models. The results demonstrate the need to further explore the supporting roles played by different types of social capital held in low-income immigrant communities.

The rest of the paper is organized as follows. The next section is a literature review of non-monetary challenges that contribute to food insecurity and social capital in immigrant communities, followed by a discussion of the data. Then we present methods used to analyze the data: the empirical model, construction of key variables, and sample weights. We present the results – the positive impact of some types of social capital on food security – and conclude with the implications of our findings.

2. Relevant literature

Food security is a multi-dimensional concept, where availability, access, utilization, and stability are described as its four pillars (FAO Food Security Programme, 2008). Availability relates to the aggregate availability of desirable foods due to supply-side factors such as food production, stock levels, and net trade; access relates to income, expenditure, markets, and prices; utilization relates to whether individuals can use the food available to them to their advantage; and stability relates to the continued rather than sporadic nature of food utilization (Byker Shanks et al., 2020; Lawlis et al., 2018; Nosratabadi et al., 2020; Sseguya et al., 2018; Wood et al., 2021). While affordability of food relates to financial constraints, other aspects of access such as physical or geographical access relate to the non-monetary constraints that individuals face. Similarly, knowledge barriers or information asymmetries that keep people from using foods and resources in their new host countries relate to the utilization pillar and are also predominantly non-monetary aspects of food security.

Not surprisingly, although food security is lower than the national average among low-income households (Coleman-Jensen et al., 2022, 2018), monetary constraints alone do not completely explain it. In 2017, among households below 185 % of the poverty threshold, 30.8 % of the households were food insecure while the remaining 69.2 % were food secure (Coleman-Jensen et al., 2018). Among immigrant communities, food security is also associated with other factors discussed below such as logistical and linguistic difficulties (Dubowitz et al., 2007; Hadley et al., 2007; Hadley and Sellen, 2006; Sanou et al., 2014; Vahabi and Damba, 2013).

2.1. Non-monetary barriers

Logistical barriers to food access and availability are common concerns shared by both immigrant and native low-income communities. These challenges include a lack of childcare facilities and the difficulty related to watching small children and shopping or cooking at the same time, and time constraints due to long and erratic work hours to make ends meet, which increases reliance on pre-prepped meals (Dubowitz et al., 2007). A unique challenge for immigrant families is limited access to familiar foods and resources (Sanou et al., 2014; Vahabi and Damba, 2013) making it difficult to find foods that were regularly consumed in their home countries in their new host countries. Often immigrants must travel further or to multiple locations to obtain desired foods and ingredients (Gingell et al., 2022; McElrone et al., 2019).

Transportation barriers are among the most researched logistical barriers (Andress and Fitch, 2016; Burns et al., 2011; Dubowitz et al., 2007; Kaufman et al., 1997; Kirkup et al., 2004; Lake and Townshend, 2006; Rose and Richards, 2004). Car-owning households are likely to be more food secure than households without a personal vehicle (Burns et al., 2011). Households without a car have to rely on public transit systems whose schedules may be inconvenient, walk along non-pedestrian roads or neighborhoods prone to crime, or shop at stores that are easily accessible even if they offer fewer choices at higher price points (Andress and Fitch, 2016; Boehmer et al., 2006; Kaufman, 1999; Morris et al., 1990).

Cultural barriers arising from new and unfamiliar systems can be loosely classified as linguistic barriers and knowledge gaps. Hunger is more likely to be indicated in households where the primary shopper experienced communication challenges and difficulty navigating the shopping environment (Gingell et al., 2022; Hadley et al., 2007; Hadley and Sellen, 2006; Vahabi and Damba, 2013). Language barriers contribute to challenges involved in navigating food systems in a new county and reduce choices available to shoppers if they cannot easily read labels and identify products or ingredients, or are unable to get help to locate products in the store (Mansour et al., 2020; Vahabi and Damba, 2013). Language barriers also accentuate challenges individuals face in using public transport to access grocery stores or using currency or SNAP benefits to buy food (Baer et al., 2021; McElrone et al., 2019).

Knowledge gaps include unfamiliarity with the food and cooking techniques of the host country, grocery retail environment, the local nutrition discourse (Sanou et al., 2014), and limited knowledge of locally available community food resources and services (Mansour et al., 2020; McElrone et al., 2019; Vahabi and Damba, 2013). For instance, not knowing how to use a can opener or unfamiliarity with frozen and canned foods could lead people to avoid frozen and canned foods (Greenwald and Zajfen, 2017). Unfamiliarity with and lack of awareness of the nutritional value and preparations of ethnic foods also pose a challenge to health and nutrition professionals working with immigrant clients (Sanou et al., 2014) indicating that knowledge gaps are also an obstacle for service providers working with immigrant communities.

2.2. Social capital in immigrant communities

Social capital has broadly been considered in the literature as bonding or externalities resulting from social interactions within a homogeneous group or bridging, i.e., externalities resulting from connections with external groups (Chriest and Niles, 2018; Forsman et al., 2012; Sseguya et al., 2018). Among immigrant communities, social

Table 1
Study sample characteristics compared to American Community Survey (ACS) samples for the West North Central Region.*

	Study sample			Households headed by persons of Somali ancestry			Households headed by Black persons			Households headed by foreign-born persons			All households		
Variable	Mean	Sd	N	Mean	Sd	N	Mean	Sd	N	Mean	Sd	N	Mean	Sd	N
Household															
Household income above $22,000 (share)	0.47[a]	0.50	225	0.52[a]	0.50	445	0.66[b]	0.47	16,912	0.78[c]	0.42	19,368	0.83[d]	0.38	426,232
Car ownership (share)	0.89[a]	0.32	245	0.78[b]	0.41	445	0.80[b]	0.40	16,912	0.90[a]	0.29	19,368	0.94[a,c]	0.24	426,232
Home ownership (share)	0.09[a]	0.29	244	0.09[a]	0.29	445	0.33[b]	0.47	16,912	0.47[c]	0.50	19,368	0.68[d]	0.47	426,232
Primary income earner															
No formal schooling (share)	0.28[a]	0.45	245	0.14[b]	0.35	445	0.02[c]	0.12	16,912	0.05[d]	0.21	19,368	0.01[e]	0.08	426,232
English proficiency (1–5 scale: 1 least proficient)	2.95[a]	1.12	245	3.06[a]	1.02	445	4.79[b]	0.64	16,912	3.61[c]	1.12	19,368	4.88[d]	0.49	426,232
Number of years in the U.S.	8.59[a]	5.91	239	12.81[b]	8.29	445	NA	NA		21.13[c]	15.38	19,368	NA	NA	
Food security															
Used SNAP at least once in past year (share)	0.58[a]	0.49	245	0.58[a]	0.49	445	0.30[b]	0.46	16,912	0.18[c]	0.38	19,368	0.10[d]	0.30	426,232
Food secure (share)**	0.78[a]	0.42	245	NA	NA	7	0.77[a]	0.42	461	0.85[a,b]	0.35	462	0.90[c]	0.30	8,056

* Means for all variables except the share of food secure households were calculated from the 2017 ACS 5-year sample. Across each row, shared superscripts imply statistical equivalance of means at the 1 % level.
** Calculated from the 2017 Current Population Survey.

capital is nurtured in ethnic enclaves or networks of people from similar ethnic, cultural, or national backgrounds (Edin et al., 2003; Portes and Jensen, 1987; Qadeer and Kumar, 2017; Xie and Gough, 2011). It is especially valuable for immigrants to cope with limited English proficiency (Sseguya et al., 2018). It can serve as information channels (Borjas and Hilton, 1996; Devillanova, 2008), provide reciprocal services like direct food aid and emotional support (Ahluwalia et al., 1998; Qadeer and Kumar, 2017), and improve labor market outcomes (Borjas, 1995, 1992; Damm, 2009; Patel and Vella, 2013).

Social capital has structural and cognitive components (Sseguya et al., 2018). Structural components include social networks and social participation in these networks, while cognitive components refer to trust in the network and the belief that social support can be received from these networks (Chriest and Niles, 2018). Higher cognitive social capital can lead to a feeling of resilience. Structural and cognitive social capital are not mutually exclusive from bridging and bonding, or other classifications of social capital, but rather overlap. For instance, bonding social capital can be both structural, if it stems from participation or membership in ethnic groups such as Somali mosques, or cognitive, if it stems from trust in the community or allows members to rely on the ethnic networks developed from engaging in ethnic groups in times of need. Similarly structural social capital can be a form of bonding capital if the groups are defined to include homogeneous participants (e.g., a Somali mosque), and bridging if the group membership includes heterogeneous individuals (e.g., hobby classes or churches attended by both native and immigrant residents from different countries).

We expand on the existing literature by examining the relationship between social capital and food security and identifying which dimensions of social capital are likely to enhance food security. Evidence of support provided within ethnic enclaves suggests that social capital held in immigrant communities is important in alleviating some non-monetary challenges to food access and improving food security among community members, which we explore in this paper. Bonding social capital in particular could strengthen the access and utilization pillars of food security among immigrant communities (Berggreen-Clausen et al., 2022; Bloom et al., 2018; Nosratabadi et al., 2020), as a resource to share knowledge on where to find desired foods, pool resources to take advantage of bulk shopping opportunities, and car-pool to the grocery store (Gingell et al., 2022).

3. Data

This study is based on primary data collected from a sample of Somali American households in the Midwestern U.S. The Somali American community in the region is mainly composed of households who came to the U.S. as refugees and tend to be low-income. The median income for households headed by persons of Somali ancestry in the West North Central (WNC) Census region that encompasses Minnesota, Iowa, Nebraska, Kansas, Missouri, North Dakota, and South Dakota was significantly lower than both Black and foreign-born households in 2017; while only 52 % of households headed by persons of Somali ancestry had income above $22,000, the corresponding rates for households headed by Black and foreign-born persons were 66 % and 78 % respectively (Table 1). For reference, 83 % of all households in the WNC region had an income greater than $22,000. Similarly, home-ownership rates of households headed by persons of Somali ancestry and education and English proficiency levels of household heads of Somali ancestry were also lower than households headed by Black and foreign-born persons (Table 1). We thus hypothesize that food security is likely to be a pressing issue with levels of food security in the community below the regional average. Given the small sample size ($n = 7$) for households headed by persons of Somali ancestry in the Current Population Survey (CPS), statistically meaningful comparisons for food security rates for the Somali American community and other populations in the region are not possible.

Data were collected from August 2017 to November 2018 using a bilingual (English and Somali) survey instrument that included sections from the Food Security Supplement (FSS) and Civic Engagement Supplement (CES) of the CPS to obtain measurements for the household food security status and social capital. Although the CPS documents the food security status of households nationally, it cannot be used to study the relationship between social capital and food security among immigrant communities, mainly because the CPS is not representative of very specific and small population sub-groups; the number of all Somali American households represented in the December 2017 CPS is <100 (U.S. Census Bureau, 2017b). The lack of existing data suitable to answer the research question necessitated designing a study to collect primary data. Students attending English as an Additional Language (EAL) classes in the Minneapolis-Saint Paul metro area pretested the survey (bilingual in English and Somali). Most community leaders and the younger American-educated community members spoke English, but a large proportion of study participants were not fluent in English. Field

research staff fluent in both Somali and English were hired to enumerate one-on-one. While a few enumerators preferred to use the Somali version of the instrument, most enumerators read and translated the English version into Somali, using the Somali version as a reference. The lead researcher conducted a training for all enumerators to standardize their comprehension of the instrument and minimize interpretation inconsistencies.

We drew our sample from seven Midwestern urban centers: Des Moines, Iowa (n = 30); Omaha, Nebraska (n = 37); Mankato (n = 26), Saint Cloud (n = 44), and Rochester (n = 37) in Minnesota; and Grand Forks-East Grand Forks (n = 30) and Fargo-Moorhead (n = 50) in both North Dakota and Minnesota. In these urban centers, we connected with community organizations and consulted with key informants and community leaders who work with the study population to identify events, organizations, and locations frequented by the community. The final sites for recruiting participants were determined by the availability and cooperation of local partners. A convenience sample was necessary because of the challenges involved in connecting with the community (Lawlis et al., 2018). To reduce selection bias and ensure a diversity of participants, we recruited participants from several different locations, contact points, and organizations to minimize the number of participants recruited via each contact (Sulaiman-Hill and Thompson, 2011). Participants were recruited and enumerated at several different EAL classes at community colleges (12 % of total participants), in residential communities (3 %), refugee community support organizations (20 %), public libraries (4 %), public schools (22 %), and Somali organizations (5 %).[2] Participants were also recruited at Somali grocery stores (5 %), mosques (14 %), and Somali restaurants (14 %). Sixty-four percent of the participants were female. Participation in the study was voluntary, and the Institutional Review Board of the author's University approved the study. Individuals who completed the survey were offered $20 gift cards.

4. Methods of analysis

In this section, we discuss the empirical model followed by definitions of key variables and construction of sample weights to replicate the distribution of households with Somali ancestry in the WNC region of the U.S. in the 2017 five-year sample of the American Community Survey (ACS) based on household income, educational attainment, and English proficiency.

4.1. Empirical model

The main equation we used to estimate the relationship between food security and different dimensions of social capital is.

$$Y_{ij} = \alpha + \mathbf{V}_{ij}\beta_{\mathbf{v}} + \mathbf{X}_{ij}\beta_{\mathbf{x}} + \beta_j + e_{ij} \quad (1).$$

Here, our outcome variable (Y_{ij}) is the level of food security of household i residing in the jth urban center. $\mathbf{V}_{ij}$ represents social capital of household i residing in j. The vector of coefficients on $\mathbf{V}$, $\boldsymbol{\beta}_{\mathbf{v}}$ reflects the impact of different dimensions of social capital on food security, if any. We expect immigrant households with higher levels of social capital to be more food secure as compared to their counterparts with lower social capital, implying positive values of $\boldsymbol{\beta}_{\mathbf{v}}$.

The vector of control variables ($\mathbf{X}$) includes socioeconomic status (household income level or a proxy for income), whether the household owns a car, whether the household relocated within the U.S. and the enumeration year. The term β_j represents urban center fixed effects. Parameters α and $\boldsymbol{\beta}$ are to be estimated, and e is the error term. The key variables in the equation are food security, social capital, and socioeconomic status, which are in turn described below.

4.2. Key variables

Food security: The U.S. Department of Agriculture (USDA) module of survey questions adopted by the CPS to measure food security is the most common measure of food security used in the literature (Martin et al., 2004; Walker et al., 2007). The module consists of 10 questions that are asked of all households and additional 8 questions for households with children; the food security status of households without children is based on their responses to the first 10 items, while all 18 items are used to determine the status of households with children (Coleman-Jensen et al., 2018). The counts of affirmative responses equal the raw food insecurity scores. To reduce the burden on participants, we used the 10-item food security module for all survey participants regardless of the children's presence.

We apply a Rasch model to convert the raw food insecurity scores into Rasch scores to represent the relationship between items used to measure the latent variable (food insecurity) and the ability of the respondent. The Rasch model provides a way to convert ordinal observations into logistic measures (Fischer and Molenaar, 2012; Rasch, 1960; Wright and Mok, 2004). It assumes that the most effective predictor of an individual response is the relationship between the level of intensity of food insecurity of the respondent and their ability to procure food. The order of the respondents and the items used to measure food insecurity are invariant (Iramaneerat et al., 2008; Rasch, 1960; Smith, 2001), i.e., a person with higher levels of food insecurity always has a higher probability of having an affirmative response to items indicating food insecurity than a person who is more food secure, irrespective of which items they encounter, and items indicating higher levels of food insecurity always have a lower probability of being affirmative than items indicating less severe food insecurity, regardless of food security levels of the respondents. For ease of interpretation, the Rasch scores were inverted to measure food security (Y_i) instead of food insecurity as the outcome variable so that the higher the score the more food secure the household is.

Social capital: We measure social capital both objectively and subjectively. For an objective measure of the household's social capital, we use the number of Somali refugees rehabilitated in the same urban center as the participant from 2002 to 2017. Data for arrivals, nationalities, and placement cities were obtained from the Bureau of Population, Refugees, and Migration. Several studies have used similar measures such as the size, concentration, or quality of the ethnic enclave as a measure of social capital in empirical research (Aizer and Currie, 2004; Åslund et al., 2011; Bertrand et al., 2000; Deri, 2005; Edin et al., 2003). As alternative measures of objective social capital for a robustness check, we also considered the number of Somali grocery stores in the urban centers and the size and proportion of the community in the county. County-level data for the size and proportion of persons of Somali ancestry were obtained from ACS 2017. All persons who spoke Somali at home, reported their ancestry as Somali, or were born in Somalia were classified as of Somali ancestry. These data were not available for Mankato and Grand Forks; we instead used the data for persons who speak languages other than English, Spanish, Asian Pacific Island languages, and other Indo-European languages. The measures of

[2] The EAL classes were especially a good recruiting ground for several reasons. First, several programs offered walk-in EAL classes that did not require students to pre-register or attend regularly. Most organizations offered anywhere between four to six levels, with level zero at the beginner level and the highest level for the most proficient group of students who were preparing for the General Education Diploma examinations, allowing us to recruit participants with a diverse range of English skills. Second, students generally planned on staying until the end of class and were not in a rush to finish the survey enumeration if we conducted it during class time. Since the enumerations took between 20 and 40 min depending on the interpreter, the length of an enumeration often became a deterrent when recruiting participants at other locations. Finally, it was easier to build trust with the community and encourage participation when EAL teachers and community leaders introduced the study.

Table 2
Sample size and objectively measured social capital (OSC).

Urban center	N	Refugees rehabilitated	Somali grocery stores	Somali population in county
Des Moines	30	520	6	1,502
Fargo-Moorhead	50	735	5	1,377
Grand Forks	30	186	2	997
Mankato	26	105	7	1,407
Omaha	32	594	4	1,075
Rochester	37	958	5	2,266
Saint Cloud	44	1,643	13	3,394

objective social capital, presented in Table 2, represent both bonding and structural social capital.

We constructed three subjective measurements of social capital from self-reported answers to questions in the survey, which are reported in Table 3. We developed each question to include multi-item measures instead of a single item to reduce inconsistencies in individual measurement error (Bernstein and Nunnally, 1994) and to fully represent the complex and multi-dimensional attributes (McIver and Carmines, 1981) of social capital.

One question accounted for the attitude toward the respondents' community and perception of how much the community could be relied on in times of need (perceived community support; PCS). This question broadly measures what has been referred to as cognitive social capital, i.e., shared norms, values and attitudes, and individual expectations of trust and reciprocity (Islam et al., 2006). Since we asked these questions of members from their community, this measurement also reflects bonding social capital in our study. Modeled after previous studies (Martin et al., 2004; Sampson et al., 1997; Swanson et al., 2008; Walker et al., 2007), the items in this question included statements such as willingness to help neighbors, whether people generally knew each other in the community, and whether the community shared common values, among others (Martin et al., 2004; Swanson et al., 2008; Walker et al., 2007). Since these items have been validated for internal consistency in previous studies, we used these items in our survey simplifying the language if appropriate (Sampson et al., 1997).

The Somali American community is close-knit (Betancourt et al., 2015; Whittaker et al., 2005). Conversations with community members revealed informal, supportive practices (S. Abdullahi & D. Sagar, personal communications, August-October 2017). The *hisab* (accounts) are maintained by Somali grocery stores for their clients, i.e., if a shopper prefers to pay later, the store owner will keep a record of their purchases in a notebook and the buyer can come and make the payments when ready. Some of the other mentioned support include borrowing ingredients from neighbors, helping community members who do not speak, read or write English, and having older women from the community help with childcare. We added four items to the PCS question to account for these community-specific practices.

The second question measured informal interaction with friends and family (informal interaction with community; IIC), modeled after similar questions in the CES. Informal interaction captured bonding social capital or ties among people who share similar personal characteristics that can foster trust or cohesiveness among members (Putnam, 2000). This question measures the frequency of connecting with friends and family, offering rides, helping with childcare, and lending and borrowing household items (U.S. Census Bureau, 2014). Media narratives have highlighted the role of Somali malls, grocery stores, and restaurants as public platforms for community members to gather, connect and interact (Natsis, 2018; Oakes, 2006; Sawyer, 2017; Shapiro, 2018). We also learned that community members sometimes help their friends and family pay bills or borrow or lend money to each other (S. Abdullahi & D. Sagar, personal communications, August-October 2017). We added these items to the instrument.

The last type of social capital we assessed was structural social capital or benefits gained from associating with formal organizations (organized group membership; OGM; Islam et al., 2006). The CES accounts for the number of civic groups the household members participated in such as parent associations or neighborhood, volunteer, and sports organizations (U.S. Census Bureau, 2014), which are not often frequented by Somali Americans. Community members are more likely to participate in EAL, job readiness, and citizenship classes, gather with

Table 3
Items used for subjective measurements of social capital.

Item (Y/N)	Mean	Sd	Fac. loads
Perceived community support, PCS (Cronbach's alpha = 0.90)			
People in our community are willing to help each other.	0.88	0.33	0.51
I could borrow $30 in an emergency from a friend or family.	0.85	0.36	0.60
People in our community can be trusted.	0.84	0.37	0.52
People in our community generally get along well with each other.	0.75	0.43	0.75
If I were sick, I could count on my friends and family to buy groceries for me.	0.74	0.44	0.75
If I were sick, I can count on friends and family to bring us meals.	0.74	0.44	0.68
Our community is close-knit, and people generally know one another.	0.72	0.45	0.80
People in our community share the same values.	0.65	0.48	0.39
Our community leaders talk to us about adapting to life in the United States.	0.57	0.50	0.72
I can sometimes get ingredients such as milk and spices from our neighbor if I run out.	0.56	0.50	0.77
I can usually get forms filled / paper work done from teachers at the EAL class, community navigators or friends or children who can read and write.	0.52	0.50	0.65
We have a credit account with a grocery store to get essentials on credit.	0.48	0.50	0.77
I know older Somali women who don't work and watch my children when necessary.	0.33	0.47	0.52
Informal interaction with community at least once a week, IIC (Cronbach's alpha = 0.69)			
See or hear from them whether in-person or otherwise	0.63	0.48	0.30
Stop for a cup of tea or coffee at the Somali / halal store or restaurant	0.49	0.50	0.36
Give each other a ride to the grocery store	0.42	0.49	0.66
Get together for a meal	0.31	0.46	0.39
House sit for each other	0.22	0.42	0.58
Watch each other's children	0.21	0.41	0.47
Lend each other things such as garden or house tools, clothes, jewelry, utensils	0.18	0.39	0.67
Send or receive money or pay bills for each other	0.14	0.34	0.33
Organized group membership, OGM (Cronbach's alpha = 0.37)*			
EAL, citizenship or job readiness classes	0.83	0.37	
Regular attendance at the mosque or Quran classes	0.65	0.48	
Cultural organization such as Somali student / youth or women's organization	0.27	0.45	
A school group such as PTA/PTO	0.20	0.40	
A church, synagogue, mosque, or other religious institution or organization, not counting your attendance at regular religious services at the mosque	0.20	0.40	
A sports or recreation organization such as a soccer club or tennis club	0.16	0.36	
A neighborhood, or community association like neighborhood watch group	0.14	0.35	
Social events with coworkers outside of work or events organized by the employer.	0.11	0.31	
Community gardens	0.09	0.29	
Hobby class, such as sewing and crafts	0.07	0.26	
A service or civic organization such as American Legion or Lions Club	0.04	0.21	

* Since the Cronbach's alpha for OGM is lower than acceptable, we use an item count instead of a factor score for OGM.

Table 4
Sample household characteristics.

Variable	Mean	Sd	N
Household			
Household income below $22,000 (Y/N)	0.47	0.50	225
Number of employed adults (persons)	1.56	1.36	239
Households with no employed adult (Y/N)	0.18	0.38	239
Car ownership (Y/N)	0.89	0.32	245
Number of cars owned	1.74	1.06	245
Alternate mode of transportation used (Y/N)	0.20	0.40	245
Home ownership (Y/N)	0.09	0.29	244
Section 8 housing (Y/N)	0.33	0.47	237
Rent ($/month)	720.92	290.87	211
Number of residences in the last 3 years	1.82	0.87	240
Number of rooms in residence	3.55	1.58	240
Household size (persons)	5.22	2.47	245
Secondary migrant household (Y/N)	0.72	0.45	244
Primary income earner			
Female (Y/N)	0.42	0.49	233
No formal schooling (Y/N)	0.28	0.45	245
English proficiency (1–5 scale: 1 least proficient)	2.95	1.12	245
Age when enumerated (years)	39.34	12.67	240
Number of years in the U.S.	8.59	5.91	239
Food security			
Sufficient and satisfactory food* (Y/N)	0.90	0.30	241
Stretched food or food money** (Y/N)	0.24	0.43	235
Difficult to talk to staff at the grocery store (Y/N)	0.27	0.44	245
Difficult to find time to go to the grocery store (Y/N)	0.24	0.43	246
Inconvenient to travel to the grocery store (Y/N)	0.17	0.37	245
Used SNAP benefits at least once in past year (Y/N)	0.58	0.49	245
SNAP benefit received ($/month)	502.48	258.79	169
Used SNAP benefits throughout past year (Y/N)	0.41	0.49	245
Children received school meals (Y/N)	0.62	0.49	242
Social capital			
Objectively measured social capital (OSC)	0.70	0.44	245
Perceived community support (PCS) factor score	0.04	0.88	245
Informal interaction in community (IIC) factor score	−0.03	0.88	229
Organized group participation (OGP) item count	2.86	1.42	245

*Households that affirmed they had 'enough of the kinds of foods they wanted to eat'.
**Households that agreed that they 'ran short of money to buy food and tried to make food or food money last longer'.

other women for activities such as *henna*, frequent Somali youth, women's or community organizations, and visit the mosque (S. Abdullahi & D. Sagar, personal communications, August-October 2017). We thus added these more culturally relevant items to the CES question. Since the question includes a broad array of organizations that include members from both Somali and non-Somali communities, this variable includes theoretical elements of both bonding and bridging social capital.

The items under each of the three questions were tested for internal consistency using Cronbach's alpha, a coefficient of reliance that examines the reliability of a test by determining the average correlation of items within the test. Typically, a coefficient of 0.7 or greater is considered reliable (Nunnally, 1978). The coefficient for PCS was 0.90, and for IIC was 0.69. OGM had a very low coefficient (alpha) at 0.37 suggesting that not everyone participated in all the diverse organizations, but rather different people participated in different organizations depending on their interests. We conducted exploratory factor analysis to determine how many factors the items could be reduced to and scores for each of those dimensions were calculated. Since all items in a question measure the same underlying attribute conceptually, we hypothesized that every question could be synthesized into one factor. For PCS and IIC, our analysis supported this hypothesis, and the 13 PCS and eight IIC items were respectively reduced to one factor each. For OGM, since Cronbach's alpha was low, we used an item count instead of a factor score. The factor loadings and Cronbach's alpha for different measures of social capital used in the paper are included in Table 3.

Socio-economic status: We used measures of income as a proxy for the socio-economic status of households. To reduce non-response rates for income, we asked a series of close-ended questions about their income range based on the income quartiles for the Somali American community in Minnesota estimated from the CPS (Hippler and Hippler, 1986; Juster and Smith, 1997; Kennickell and Woodburn, 1997; Moore and Loomis, 2001; Ralph, 1984; Ross and Reynolds, 1996).

In addition to income, other factors such as car ownership, years of schooling, age of the household head, and years of residence in the U.S. could also influence the socioeconomic status of households. However, all these variables are closely related. For instance, car ownership could impact income if one can work more hours by saving commute time, and income, in turn, would determine whether a household can afford a car. Given the relatively small sample size, we used only income in the model and then conducted a sensitivity analysis using the education, age, and English proficiency of the primary income earner as alternative proxies for socioeconomic status.

4.3. Sample weights

Since we used a convenience sample, some households like those having a member attending EAL classes had a higher probability of being sampled resulting in a coverage error (Vaske et al., 2011), i.e., a discrepancy between the overall population and the subset of households included in the study. Because the use of such a non-probability sample to draw inferences about the general population can produce biased estimates (Salant and Dillman, 1994), sampling weights were used to correct for selecting units with unequal probabilities (Yansaneh, 2003).

We used cell weighting to adjust the sample distribution so that the weighted distribution of households who participated in our study replicates the distribution of the Somali American population in the WNC region of the U.S. in the 2017 ACS data. To calculate the weights, we stratified the sample using education level, income quartile, and English proficiency. Weights were calculated for each stratum to achieve the desired sample distribution using the formula $w_{ig} = N_g/n_g$ where w_{ig} is the weight for observation i from group g, N_g is the population size of group g, and n_g is the size of the sample drawn from group g (Sharot, 1986; Sturgis, 2004).

5. Results

In this section, we describe food security and social capital in the study community and then discuss the estimation results. The analysis is based on a weight-adjusted sample of 249 observations. Our weight-adjusted sample is comparable with households headed by persons of Somali ancestry in the ACS with respect to most key characteristics; it is statistically equivalent to the sample of households in the ACS headed by persons of Somali ancestry with respect to household income, home ownership, English proficiency of the household head, and SNAP usage (Table 1). As noted earlier, socioeconomic characteristics of households of Somali ancestry are largely distinct from those of Black and foreign-born households in the WNC region, who are also different from all households in the region (Table 1).

5.1. Sample household characteristics

Slightly less than half of the community (47 %) earned more than $22,000 annually (Table 4). While the mean number of working adults per household was 1.56, 18 % of the households had no employed adults. Although 89 % of households owned personal vehicles, the primary grocery shopper relied on rides from others if they did not drive or other family members used the car for work. Thus, 20 % of households' grocery shoppers relied on alternate modes of transport such as rides from friends and family, public transit, or walking to the grocery store.

Table 5
Food security scores.

Food insecurity Index	Sample (%)	Mean	Sd	Min	Max
		(Rasch food security score)			
Food secure (0)	40.3	3.75	0.00	3.8	3.8
Marginally food secure (1–2)	37.3	2.98	0.20	2.6	3.1
Low food security (3–5)	17.6	2.07	0.23	1.7	2.3
Very low food security (6–10)	4.7	1.32	0.18	0.6	1.5
Total	100.0	3.05	0.74	0.6	3.8

Table 6
Awareness and usage of food resources.

	SNAP	WIC	Food pantries	Other*
	————Percentage of households————			
Don't know this program/resource	6.0	15.5	44.3	46.1
Eligible or aware but not used	6.1	9.8	40.1	45.6
Used in the last 12 months	62.8	36.6	15.7	8.4
Know the program but don't know if we are eligible	1.5	3.4	–	–
Know the program but not eligible	23.6	34.6	–	–
Total	100.0	99.9	100.1	100.0

*Other includes meals-on wheels, soup kitchens and senior homes.

Table 7
Relationship between social capital and food security.

Outcome: Rasch food security	(1)	(2)	(3)	(4)	(5)
Objective social capital (OSC)	0.647*	0.667*	0.560**	0.591*	0.546**
	(0.219)	(0.226)	(0.072)	(0.222)	(0.068)
Perceived community support (PCS)		−0.064			−0.016
		(0.059)			(0.033)
Informal interaction with community (IIC)			−0.213*		−0.210*
			(0.067)		(0.068)
Organized group membership (OGM)				−0.062	−0.044
				(0.044)	(0.041)
Household income below $22,000	−0.426*	−0.433*	−0.413*	−0.430*	−0.416*
	(0.122)	(0.124)	(0.114)	(0.135)	(0.119)
Household owns car	0.221*	0.211*	0.253	0.218*	0.272
	(0.066)	(0.069)	(0.118)	(0.081)	(0.122)
Secondary migrant household	−0.150	−0.127	−0.214	−0.139	−0.202
	(0.184)	(0.190)	(0.163)	(0.175)	(0.163)
R^2	0.26	0.26	0.33	0.27	0.34
N	224	224	208	224	208
Community Fixed Effects	Yes	Yes	Yes	Yes	Yes

* $p < 0.05$; ** $p < 0.01$.
Robust standard errors clustered by urban center in parentheses.

The homeownership rate was low (9 %) and reliance on subsidized housing was high; 33 % of the households lived in Section 8 housing. On average, households had lived in 1.82 residences in the three years preceding the survey, the mean monthly rent was $721, and the average size of the residence was 3.55 rooms. The average household size was 5.22 persons. Out-migration from the state-assigned host city to another American city (secondary migration) was 72 %. Forty-two percent of primary income earners were female and 28 % had no formal schooling. Their self-rated English proficiency was 2.95 on a scale of one to five with one indicating a very low level of fluency and five indicating a very good command of the language. Their mean age was 39 years, and they had lived in the U.S. on average for 8.59 years.

Table 8
Relationship between social capital and food security with enclave size effects.

Outcome: Rasch food security	(1)	(2)	(3)	(4)
Objective social capital (OSC)	0.613*	0.407**	0.574	0.607*
	(0.220)	(0.085)	(0.400)	(0.182)
Perceived community support (PCS)	−0.154*			0.055
	(0.055)			(0.028)
PCS * OSC	0.140*			−0.078
	(0.041)			(0.042)
Informal interaction w/ community (IIC)		−0.433**		−0.424**
		(0.064)		(0.060)
IIC * OSC		0.304**		0.278**
		(0.053)		(0.047)
Organized group membership (OGM)			−0.067	0.012
			(0.103)	(0.048)
OGM * OSC			0.007	−0.077
			(0.100)	(0.074)
Household income above $22,000	−0.437*	−0.388*	−0.431*	−0.386*
	(0.126)	(0.113)	(0.134)	(0.114)
Household owns car	0.210*	0.271	0.217*	0.306
	(0.067)	(0.129)	(0.084)	(0.139)
Secondary migrant household	−0.125	−0.220	−0.139	−0.217
	(0.191)	(0.168)	(0.176)	(0.163)
R^2	0.27	0.35	0.27	0.36
N	224	208	224	208
Community Fixed Effects	Yes	Yes	Yes	Yes

* $p < 0.05$; ** $p < 0.01$.
Robust standard errors clustered by urban center in parentheses.

5.2. Food security in the study sample

The food security rate was 78 % in the study community and the remaining 22 % were food insecure with 17 % reporting low food security and almost 5 % reporting very low food security (Table 5). This level of food security is comparable to households headed by Black persons, for whom the food security rate stood at 77 % in the same time period, but significantly lower than the food security rates for households headed by foreign-born persons (85 %; $p = 0.026$) and all households in the WNC regions for whom the food security rate was 90 % ($p < 0.0001$) (Table 1). The mean Rasch food security score for the sample was 3.05, with the most food secure households averaging 3.75 and the most food insecure households averaging 1.32 (Table 5). While 90 % of the households affirmed having 'enough of the kinds of foods they wanted to eat', 24 % agreed they 'ran short of money to buy food and tried to make food or food money last longer' (Table 4). Approximately a quarter of the community reported challenges to food procurement, such as communicating with grocery store staff, time constraints, and commuting difficulties.

Fifty-eight percent of households had received SNAP benefits in at least one month in the year preceding the survey averaging $502, while 41 % had used SNAP benefits in all 12 months (Table 4). Sixty-two percent of the households had at least one child benefiting from school meals in the 12 months preceding the survey. The usage and awareness of different food assistance programs and community resources are reported in Table 6. Almost everyone (94 % households) was aware of SNAP, and 6 % eligible households had not availed of SNAP benefits. But awareness of other resources was not as high; <10 % had used senior centers, soup kitchens, or meals-on-wheels, and around 15 % had used food pantries in the 12 months preceding the survey.

5.3. Social capital in the study sample

The number of Somali refugees officially rehabilitated in the different study locations ranged from 105 in Mankato to 1,643 in Saint Cloud (Table 2). In our analysis, we scaled these numbers by 1,000, so that the mean value of objective social capital in our estimation sample was 0.70. The three dimensions of social capital we considered were perceived community support (PCS), informal interaction with the

community (IIC), and organized group membership (OGM). The mean first factor scores for PCS and IIC were 0.04 and −0.03, respectively. The mean item count for OGM was 2.86 on a scale of 11 (Table 4).

The percentage of affirmative responses to all the items used to measure social capital is presented in Table 3. Eight of the ten items with most affirmative responses represent PCS suggesting that is the most prevalent form of social capital held in the community. Eighty-eight percent agreed that people in the community are willing to help each other. This is confirmed by the other items included in the top ten such as in an emergency they could borrow $30 from their social network (including family who do not live in the same dwelling as the respondents or friends), count on them to shop for groceries, or bring meals if they were sick. The responses indicate high levels of trust in the community with a majority affirming that community members can be trusted (84 %), generally get along with each other (75 %), know each other (72 %), and share the same values (65 %). The other two items in the top ten were whether the respondent sees or hears from their social network, in person or otherwise, at least once a week (IIC), and regular attendance at mosque or Quran classes (OGM). Almost half of households had an account with a Somali grocery store to get essentials on credit. At the bottom end, all the items with<10 % affirmative responses were measures of OGM: attendance of social events with co-workers outside of work, participation in community gardens, hobby classes, and civic organizations.

To understand how the relationship between social capital and socio-economic status highlighted by past scholars (Durlauf and Fafchamps, 2005) can bias our estimates, we present the results of regressing social capital measures used in the analysis on the socio-economic indicators of households in the Appendix (Table A1). In our sample, there was no statistically significant relationship between the socio-economic indicators like income of the household, English proficiency and schooling of the household head, and car ownership with social capital.

5.4. Estimation results

Tables 7 and 8 report the results of the empirical models in Equation (1) that relate social capital and food security using the weighted sample. Here the dependent variable is the Rasch household food security score, and the independent variables are different measures of social capital and socio-economic status of the households. We also control for car ownership since it directly impacts the ability of households to access grocery stores and secondary migration to ensure these households do not bias the results. We also used urban center fixed effects and robust standard errors clustered by urban center. The results show the improvements in food security that some dimensions of social capital contribute to.

In Table 7, objective social capital is associated with an improvement in the household food security score, where an additional 1,000 persons from Somalia rehabilitated in an urban center increases food security among local Somali American households by 0.5 to 0.6 points. Contrary to our hypothesis, the impacts of the subjective measures of social capital are not positive; in fact, informal interactions with community (IIC) has a significant negative association with food security. The measure of socioeconomic status in Table 7 is a dummy variable equaling one if the household's income is below $22,000. These households were significantly less food secure than households earning more than $22,000 annually. Car ownership increased the household food security score by about 0.2 points, but it was not significant across all models estimated. The relationship observed between income and food security suggests that poverty is one of the key factors responsible for food security, but car ownership also enhances ability of households to maintain food security. The results also indicate that there was no difference in the food security status of households between those who stayed in their assigned city and those who moved to a different city after arriving in the U.S.

In Table 8, we interacted different measures of subjective social capital with objective social capital to understand the impact of ethnic enclaves when individual exposure to the size of the enclave is accounted for. These results echoed the findings of the previous model that objective social capital improves food security outcomes of households while subjective social capital seemingly does not. However, the interaction terms uncovered additional insight. In Models 1 and 2, although the coefficients on PCS and IIC are negative indicating that food secure households are less likely to perceive themselves as having community support or engage with the community likely because they are able to afford formal services, the coefficients on the interaction terms were positive and significant. For every unit increase in size of the ethnic enclave and perceived community support within the enclave, the household food security increased by 0.14 points, and for social engagement within the enclave, the household food security increases by 0.30 points.

5.5. Sensitivity analysis

We conducted robustness tests to check the sensitivity of our results to different socio-economic indicators and any bias introduced by secondary migrant households. These are presented in the Appendix (Tables A2-A4) and discussed below.

The results using different socio-economic indicators were qualitatively similar across all indicators, and in the interest of space, we only present the results for Model 5 in Table 7 and Model 4 in Table 8 in the Appendix (Table A2). The positive associations between food security with objective social capital and with car ownership remained. Among all the socio-economic indicators used in the model, English proficiency of the primary income earner had a significant association with household's food security in the expected directions. A one-level improvement in English proficiency was associated with an increase in the food security score by 0.1 points. PCS was associated with an improvement in the food security score, particularly when the enclave size effect was accounted for, while IIC was negatively associated. Results using different measurements of objective social capital show the association between objective social capital and food security remained positive and significant (Table A3).

Our sample also includes secondary migrant households, i.e., households who relocated to a new city within the U.S. It is possible that households self-select into urban centers they have a social network in leading to biased estimates. The estimation results restricting our sample to households that did not relocate after arriving in the U.S. suggests that secondary migrant households bias our estimates downwards. In the results from the restricted sample (Table A4), the magnitude of the coefficients on objective social capital are higher than those reported in Table 7, with an increase in the size of the community by 1,000 persons associated with almost a whole unit increase in household food security.

6. Discussion

In this paper, we empirically demonstrate low levels of food security and social capital in the case of Somali American communities in the Midwest. We found food security in the study community stood at 78 %, compared to 89 % among all households in the Midwestern states in 2017. The rate was statistically lower than all households in the WNC region. This is consistent with previous studies reporting low levels of food security among other immigrant communities (Capps et al., 2009; Hadley et al., 2007; Quandt et al., 2006; Vahabi et al., 2011).

We also documented an empirical relationship between social capital and food security within the Somali American communities in the Midwest. We found that objective social capital measured as the size of the ethnic enclave had a significantly positive association with the food security outcomes of the respondents. This is consistent with studies that have found positive impacts of ethnic capital on outcomes such as skills and earnings (Åslund et al., 2011; Borjas, 1995; Damm, 2009; Edin et al., 2003; Patel and Vella, 2013).

Our findings, in the context of food security, are consistent with the reported tendencies of low-skilled refugees to self-select into ethnic enclaves while benefitting the most from sorting into ethnic enclaves (Åslund et al., 2011; Damm, 2009; Edin et al., 2003). A positive relationship between perceived community support (PCS) and secondary migration we found could result from similar self-selection into urban centers associated with higher perceived levels of social capital. We also observed a negative, albeit not significant, relationship between secondary migration and food security, suggesting less food secure households tend to migrate.

We observed a negative relationship between IIC and food security, yet when interacted with the size of the ethnic community, the relationship was positive and significant. The negative coefficient on informal interaction is possibly a result of endogeneity resulting from food insecure households engaging in more informal interactions out of necessity and food secure households not needing to rely as much on the social network leading to fewer informal interactions. When we capture the combined exposure of households to the objective social capital through informal interaction, we see that despite engaging with the community out of necessity, households get help from these informal interactions and stave off food insufficiency. Our results thus lend support to findings such as from Åslund et al. (2011), who suggested that boys and children with less educated parents benefitted the most from schooling in ethnic enclaves possibly because other community members made up for the lack of role models at home.

Not surprisingly, the tendency to self-select is responsible for biased coefficient estimates. The literature notes that sorting causes the coefficient on ethnic enclaves to be underestimated, downplaying the importance of ethnic enclaves to low-skilled community members (Åslund et al., 2011; Damm, 2009; Edin et al., 2003). The results we report in the Appendix (Table A4) support this; the magnitude of the coefficient on objective social capital is much greater when secondary migrant households are excluded from the analysis.

This study is also instrumental in demonstrating the shortcomings of how the concept of food security is understood and measured. We documented the monetary and non-monetary resources shared informally among community members to manage food shortages and found a significant reliance on community-based support systems among the Somali American communities. The observed coping mechanisms contribute to an emerging strand of literature seeking to uncover the experiential nature of food insecurity, i.e., the diverse set of experiences related to food insecurity among individuals, households, and communities in addition to the more universal experiences such as insufficient quantity of food, inadequate nutrition, and worry regarding food (Coates et al., 2006).

Such coping mechanisms and other experiential aspects of food insecurity are largely unaccounted for in the definition and measurements of food security purported by the USDA (Byker Shanks et al., 2020). Instead, it focuses narrowly on food sufficiency causing households to be classified as food secure if they have sufficient food to consume despite the hardships, they endure to procure it. The non-monetary barriers we highlighted in this paper suggest that food security is complex and for the definition to reflect the pillars of food security, its measurement should take into account both monetary and other non-monetary resources, such as time, knowledge, and ability to obtain, prepare and consume foods in an acceptable manner. With a more nuanced definition and measurement of food insecurity, such households would more appropriately be classified as food insecure. That is, to be classified as food secure, households should consistently be able to acquire food and access knowledge and resources necessary to prepare adequate foods that meet their food preferences and dietary requirements, without resorting to any coping strategies that entail psychological discomfort, guilt, or shame.

Lastly, another limitation of the current food security measurement is it does not consider the diverse life circumstances that shape our understanding of the concept. For instance, recent immigrants with experiences of food scarcity are likely to perceive abundance of food in the U.S. (McMorrow and Saksena, 2021). During data collection, several questions related to food sufficiency in the instrument were greeted with comments such as *"Here in America there is so much food", "Food is so cheap here"*, and *"Praise the God for plenty of food compared to back home"* causing us to believe several respondents - especially recent immigrants - are likely to under-report food insecurity because of the recent memory of more severe food shortages they confronted before resettling in the U. S. Future research would benefit from contextualizing questions related to food sufficiency and developing a multidimensional and more culturally appropriate scale to measure food security among immigrant communities.

7. Conclusion

In this paper, we examined the relationship between social capital on food security through a case study of the Somali American community in the Midwest. We found that objective social capital and car ownership have a positive and significant association with food security across all models, while various dimensions of social capital considered in the analysis had differing effects on food security. This finding suggests that while several different instruments have been used to measure latent concepts such as social capital, social interaction, and social network, not all social connections help to accrue social capital. In this case study, objective social capital and cognitive social capital measured as perceived community support were shown to be effective in improving food security among households, while bonding social capital measured as informal interactions with community and structural social capital measured as participation in organized groups had no effect.

As a case study based on a convenience sample, our study is limited. While we attempted to diversify our recruitment channels, some groups had a higher probability of being sampled than others. Selection bias is inevitable for those recruited at group activities such as EAL classes, which inherently help them accumulate social capital. The study is also not free of other limitations of convenience samples such as non-response and desirability biases that we are unable to control for in our models. While we collected data anonymously, there could be bias resulting from social desirability in a small community, if respondents felt obligated to answer questions in a certain way, if there were differences in the comprehension of enumerators, or if enumerators encouraged respondents to answer in a certain way. We, however, were informed by the community partners that food sharing is considered regular practice in the community, and many community members were willing to complete the survey unless they were under time constraints. We also trained all enumerators to refrain from encouraging specific answers but to accept the diverse realities and opinions of respondents even if they were different from their personal beliefs. While it is still possible that respondents systematically misreported social capital, the use of both objective and subjective forms of social capital helps validate our results against biases resulting from social desirability bias. It remains to be seen if similar effects can be found consistently across other vulnerable populations.

Social capital and the other coping mechanisms we highlighted are examples of informal systems used by excluded communities everywhere to overcome challenges they face. These findings are relevant to not only refugees but also to other low-income immigrant communities that develop informal or unorganized systems in the absence of formal services. These systems including social capital should not be viewed as solutions but rather as temporary arrangements that policymakers need to develop more permanent, inclusive, and reliable substitutes for.

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CRediT authorship contribution statement

Harshada Karnik: Conceptualization, Methodology, Project administration, Funding acquisition, Investigation, Data curation, Formal analysis, Writing – original draft, Writing – review & editing. **Hikaru Hanawa Peterson:** Conceptualization, Methodology, Supervision, Writing – review & editing.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability statement:

Replication materials will be made available through the Data Repository for University of Minnesota (DRUM).

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Appendix

Table A1
Socioeconomic indicators and social capital.

Outcome: Social capital	(1) Objective social capital (OSC)	(2) Perceived community support (PCS)	(3) Informal interaction with community (IIC)	(4) Organized group membership (OGM)
Household income below $22,000	−0.120	−0.175	0.136	−0.027
	(0.074)	(0.137)	(0.111)	(0.282)
English proficiency of household head	−0.116	0.041	0.066	−0.069
	(0.064)	(0.086)	(0.099)	(0.115)
Household head has no schooling	0.194	−0.064	0.151	0.090
	(0.123)	(0.114)	(0.299)	(0.236)
Household owns car	−0.072	−0.078	−0.055	0.141
	(0.051)	(0.102)	(0.162)	(0.229)
Age of the household head	−0.001	0.011*	0.010**	−0.013
	(0.002)	(0.004)	(0.002)	(0.009)
Secondary migrant household	0.075	0.411**	−0.178*	0.163
	(0.120)	(0.058)	(0.056)	(0.161)
R^2	0.43	0.60	0.27	0.36
N	220	220	204	220
Community Fixed Effects	Yes	Yes	Yes	Yes

* $p < 0.05$; ** $p < 0.01$.
Robust standard errors clustered by urban center in parentheses.

Table A2
Relationship between social capital and food security (Sensitivity to different socioeconomic indicatiors).

Outcome: Rasch food security score	(1)	(2)	(3)	(4)	(5)	(6)
Socioeconomic indicator:	English proficiency	English proficiency	Age	Age	No formal schooling	No formal schooling
Objective social capital (OSC)	0.877**	0.719**	0.636**	0.418*	0.670**	0.409*
	(0.096)	(0.081)	(0.080)	(0.133)	(0.098)	(0.145)
Perceived community support (PCS)	0.056*	0.152*	0.095*	0.269**	0.066	0.201**
	(0.023)	(0.059)	(0.027)	(0.072)	(0.028)	(0.053)
PCS * OSC		−0.085		−0.197		−0.139
		(0.073)		(0.097)		(0.069)
Informal interaction w/ community (IIC)	−0.185	−0.605**	−0.168	−0.584**	−0.161	−0.599**
	(0.124)	(0.098)	(0.127)	(0.101)	(0.135)	(0.093)
IIC * OSC		0.547**		0.532**		0.572**
		(0.106)		(0.127)		(0.121)
Organized group membership (OGM)	−0.030	0.001	−0.047	−0.042	−0.037	−0.036

(*continued on next page*)

Table A2 (*continued*)

Outcome: Rasch food security score	(1)	(2)	(3)	(4)	(5)	(6)
Socioeconomic indicator:	English proficiency	English proficiency	Age	Age	No formal schooling	No formal schooling
	(0.030)	(0.026)	(0.034)	(0.056)	(0.029)	(0.052)
OGM * OSC		−0.032		0.007		0.011
		(0.025)		(0.059)		(0.051)
Socioeconomic indicator	0.154*	0.168*	−0.006	−0.006	−0.307	−0.361*
	(0.062)	(0.046)	(0.004)	(0.004)	(0.178)	(0.139)
Household owns car	0.380*	0.401*	0.433**	0.434*	0.488*	0.515*
	(0.125)	(0.138)	(0.113)	(0.123)	(0.142)	(0.161)
Secondary migrant household	−0.212	−0.265	−0.198	−0.248	−0.174	−0.233
	(0.144)	(0.133)	(0.143)	(0.136)	(0.141)	(0.145)
R^2	0.31	0.37	0.26	0.32	0.29	0.36
N	228	228	223	223	228	228
Community Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes

* $p < 0.05$; ** $p < 0.01$.
Robust standard errors clustered by urban center in parentheses.

Table A3
Relationship between social capital and food security (Sensitivity to different measurements of objective social capital).

Outcome: Rasch food security score	(1)	(2)	(3)	(4)	(5)	(6)
Objective social capital:	Number of Somali stores		Size of Somali community		Proportion of Somali community	
Objective social capital (OSC)	0.088**	0.097*	0.324**	0.360*	0.141**	0.156*
	(0.011)	(0.029)	(0.041)	(0.108)	(0.018)	(0.047)
Perceived community support	−0.016	0.055	−0.016	0.055	−0.016	0.055
	(0.033)	(0.028)	(0.033)	(0.028)	(0.033)	(0.028)
PCS * OSC		−0.078		−0.078		−0.078
		(0.042)		(0.042)		(0.042)
Informal interaction w/ community (IIC)	−0.210*	−0.424**	−0.210*	−0.424**	−0.210*	−0.424**
	(0.068)	(0.060)	(0.068)	(0.060)	(0.068)	(0.060)
IIC * OSC		0.278**		0.278**		0.278**
		(0.047)		(0.047)		(0.047)
Organized group participation (OGP)	−0.044	0.012	−0.044	0.012	−0.044	0.012
	(0.041)	(0.048)	(0.041)	(0.048)	(0.041)	(0.048)
OGP * OSC		−0.077		−0.077		−0.077
		(0.074)		(0.074)		(0.074)
Household income below $22,000	−0.416*	−0.386*	−0.416*	−0.386*	−0.416*	−0.386*
	(0.119)	(0.114)	(0.119)	(0.114)	(0.119)	(0.114)
Household owns car	0.272	0.306	0.272	0.306	0.272	0.306
	(0.122)	(0.139)	(0.122)	(0.139)	(0.122)	(0.139)
Secondary migrant household	−0.202	−0.217	−0.202	−0.217	−0.202	−0.217
	(0.163)	(0.163)	(0.163)	(0.163)	(0.163)	(0.163)
R^2	0.34	0.36	0.34	0.36	0.34	0.36
N	208	208	208	208	208	208
Community Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes

* $p < 0.05$; ** $p < 0.01$.
Robust standard errors clustered by urban center in parentheses.

Table A4
Relationship between social capital and food security among non secondary migrant households.

Outcome: Rasch food security	(1)	(2)	(3)	(4)	(5)
Objective social capital (OSC)	1.188**	1.222**	1.226*	1.812**	1.660*
	(0.072)	(0.163)	(0.453)	(0.301)	(0.579)
Perceived community support (PCS)		0.033			−0.160
		(0.281)			(0.290)
PCS * OSC		0.040			0.133
		(0.215)			(0.204)
Informal interaction w/ community (IIC)			−0.309		−0.265
			(0.339)		(0.316)
IIC * OSC			0.211		0.143
			(0.329)		(0.304)
Organized group membership (OGM)				0.308	0.290
				(0.166)	(0.215)
OGM * OSC				−0.236	−0.203
				(0.141)	(0.135)
Household income below $22,000	−0.371*	−0.377*	−0.363*	−0.306**	−0.291*
	(0.140)	(0.131)	(0.109)	(0.050)	(0.111)
Household owns car	0.275*	0.304*	0.492	0.228	0.333

(*continued on next page*)

Table A4 (*continued*)

Outcome: Rasch food security	(1)	(2)	(3)	(4)	(5)
	(0.105)	(0.120)	(0.476)	(0.128)	(0.594)
R^2	0.48	0.48	0.55	0.51	0.58
N	85	85	79	85	79
Community Fixed Effects	Yes	Yes	Yes	Yes	Yes

* $p < 0.05$; ** $p < 0.01$.
Robust standard errors clustered by urban center in parentheses.

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