BMJ Open

Individual-level social capital is associated with depressive symptoms among middle-aged community dwellers in rural Vietnam: a cross-sectional study

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To cite: Do AD, Pham TTP, Nguyen CQ, *et al*. Individual-level social capital is associated with depressive symptoms among middle-aged community dwellers in rural Vietnam: a cross-sectional study. *BMJ Open* 2022;**12**:e064998. doi:10.1136/bmjopen-2022-064998

► Prepublication history and additional supplemental material for this paper are available online. To view these files, please visit the journal online (http://dx.doi.org/10.1136/bmjopen-2022-064998).

Received 30 May 2022
Accepted 28 October 2022

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ABSTRACT

Objectives There has been comparatively little research on the association between social capital and depressive symptoms in low- and middle-income countries. To address this deficit this study examined the association among middle-aged adults in rural Vietnam.

Design A cross-sectional study.

Setting Data came from the baseline survey of the Khánh Hòa Cardiovascular Study, which is an ongoing prospective cohort study aiming to elucidate the determinants of cardiovascular diseases.

Participants A total of 3000 people aged 40–60 years old residing in rural communes in Khánh Hòa province, Vietnam.

Exposure of interest Cognitive social capital (ie, low, middle and high) and structural social capital (in terms of social participation; yes or no) were assessed via a questionnaire.

Primary outcome measure Depressive symptoms were assessed with the 11-item Center for Epidemiologic Studies Depression Scale.

Results A robust Poisson regression model revealed that adults in the highest versus lowest cognitive social capital tertile had a 61% lower prevalence of depressive symptoms (prevalence ratio (PR)=0.39, 95% CI=0.31 to 0.49). Individuals with higher structural social capital were also significantly less likely to experience depressive symptoms (PR=0.74, 95% CI=0.61 to 0.90).

Conclusion In a cohort of 3000 middle-aged rural residents in Vietnam, both cognitive and structural social capital assessed at the individual level were inversely associated with the prevalence of depressive symptoms.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ There has been little research on the association between social capital and depressive symptoms in low- and middle-income countries.
⇒ This study assessed individual-level social capital both in terms of cognitive social capital and structural social capital.
⇒ As social capital and depressive symptoms were both measured using a questionnaire, the responses might have been affected by common methods bias.
⇒ The cross-sectional design of the current study does not allow us to infer any causal relationships.

INTRODUCTION

Social capital, which has been defined as the institutions, relationships and norms that shape the quality and frequency of social interactions, has been widely examined in relation to a variety of health outcomes.[1–3] Despite heterogeneity in the measurement of social capital (eg, structural vs cognitive; bonding vs bridging; or horizontal vs vertical; individual-level or aggregate-level[1]—see online supplemental table 1 for details), previous studies have suggested that social capital (assessed at both an individual and aggregate level) protects people from a range of negative health outcomes (eg, worse self-rated health, cardiovascular diseases (CVDs), cancer and mortality[4 5]) although with some exceptions.[3]

Depression is one such health outcome that has been widely studied in relation to social capital.[2 6 7] For example, systematic reviews by De Silva *et al*[6] and Ehsan and De Silva[7] provided evidence of an inverse association between social capital and depression, with stronger evidence observed for cognitive versus structural social capital. This finding of a stronger association for cognitive social capital in relation to mental health outcomes has also been supported by a recent meta-regression analysis by Xue *et al* (*coefficient*=0.024, p<0.01).[2] Previous studies have suggested that social capital may help alleviate depressive symptoms by reducing daily stressors and by facilitating the provision of higher levels of social support.[7]

Despite these previous studies, several issues remain to be addressed. First, only a handful of studies have focused on the association between social capital and depression

in low- and middle-income countries (LMICs).[8–11] This is a significant gap in our knowledge given that societal changes associated with economic growth in recent decades might underlie the increase observed in depressive symptoms in LMICs,[12 13] and that investigating the association between social capital and depressive symptoms may be helpful when it comes to strengthening efforts to mitigate the disease burden in LMICs.[14] Vietnam is one such country that has experienced rapid economic growth,[15] but where there is still a lack of research on social capital and its effects. Second, while the above-mentioned systematic reviews and meta-analysis have suggested a difference in the associations of cognitive and structural social capital and mental health,[2 6 7] only a few studies have simultaneously assessed the differential associations in the same study.[6 10] Using multiple measures of social capital will allow the association to be assessed in a more comprehensive manner. Third, many health-risk lifestyle factors (such as smoking, alcohol consumption or physical activity) were not taken into account when examining the relationship between social capital and health, and this remains a major gap in recent studies carried out in LMICs.[13 16]

Therefore, this study aimed to examine the association between social capital, assessed both in terms of cognitive and structural social capital, and depressive symptoms among middle-aged rural residents in Khánh Hòa, Vietnam.

METHODS

Study design

The Khánh Hòa Cardiovascular Study (KHCS) is an ongoing cohort study aiming to elucidate the determinants of CVDs, particularly those specific to the Vietnamese population. The KHCS chose eight communes in one of the districts in Khánh Hòa province, Vietnam, as the study sites, which were deemed average in terms of their affluence in rural Vietnam. Based on a list of residents aged 40–59 years old (at the time of recruitment) in each commune which was created by commune health centre staff members, eligible community members were invited to participate in the study until we obtained a total of 3000 residents (consent rate: 75–87%).

The baseline survey, which collected questionnaire information on lifestyle parameters, anthropometry and biochemical measurements, was conducted during the period between June 2019 and June 2020. Face-to-face interviews were conducted at commune health centres and all participants received 500 000 Vietnamese dong (VND) as remuneration for their participation in the study (one US dollar was equivalent to 23 475 VND as of 1 June 2019).

Depressive symptoms

Depressive symptoms were measured with the short version of the Center for Epidemiologic Studies Depression scale (CES-D, 11 items).[17–19] This measure consists of 11 questions on how often participants had experienced symptoms associated with depression in the past week, for example, loss of appetite, feeling sad, feeling lonely and low-quality sleep. Each item was scored from 0 to 3 with the following response options: 'rarely or none of the time (score=0)', 'some or a little of the time (score=1)', 'occasionally or a moderate amount of the time (score=2)' and 'most of the time (score=3)'. Following the lead of previous research which used an arithmetic conversion to define a cut-off score,[20] individuals with a score of ≥9 were classified as having depressive symptoms. The Cronbach's alpha value of the scale was 0.79 in our study.

Social capital

Structural social capital (ie, actual behaviours such as participation in informal and formal social organisations[21]) was assessed by asking participants if they participated in the following community organisations during the previous 12 months: professional/trade union organisations; cooperatives; women's unions; farmers' associations; veterans' associations; religious groups, credit groups/life insurance groups; sports groups. These organisations were chosen based on our discussions with local residents and with reference to previous research.[22–24] In accordance with previous studies,[25 26] a respondent was categorised as possessing structural social capital if they had participated in any of these organisations once a month or more frequently in the last 12 months.

Cognitive social capital (ie, individual attitudes, perceptions and cognitions about the group to which a person belongs[27]) was assessed by asking participants to what extent they agreed with the following four statements, which came from a short version of the Adapted Social Capital Assessment Tool (SASCAT), that has been used previously in Vietnam[22 24]; (1) a majority of the people in the commune are trustworthy, (2) a majority of the people in the commune have a good relationship with one another, (3) you (the participant) are really part of the commune and (4) a majority of the people in the commune would take advantage of you if given the opportunity (reverse coded).[28] The response options were 'Not at all', 'Not very much', 'Cannot say', 'To some extent' and 'Greatly' which were assigned the values of 1–5. After we confirmed that these items were internally consistent (Cronbach's alpha=0.79), we followed the lead of previous studies[23 29 30] and computed the total score (range: 5–20) with higher values indicating increased cognitive social capital. For the subsequent analysis, participants were categorised into tertiles: Low (5–14 points); middle (15–18 points); and high (19–20 points).

Covariates

Socio-demographic factors were included in the analysis as confounders when examining the association between social capital and depressive symptoms; age

(in years), sex (male and female), education (primary school or less; junior high school; high school and higher), marital status (married; not married), current employment (employed by the government; employed by the private sector; self-employed; farmer or fisher; homemaker; unemployed or retired).[3 31 32] Information on household income was obtained by asking household representatives to choose one of the following categories that best described their annual household income (VND): ≤1 000 000; 1 000 001–≤2 000 000; 2 000 001–≤3 000 000; 3 000 001–≤4 000 000; 4 000 001–≤6 000 000; 6 000 001–≤8 000 000; 8 000 001–≤12 000 000; 12 000 001–≤16 000 000; 16 000 001–≤20 000 000; >20 000 000; or do not know), with each respondent being assigned the midpoint of the range as a proxy score except for the last category being assigned VND 22 000 000. We divided the values by the square root of the number of household members to calculate equivalised income[33] and categorised household income into three groups by tertiles (low, middle and high).

Questionnaire information was also collected on various lifestyle parameters, including: smoking (never, former and current smokers), daily alcohol consumption (do not drink; less than 1 standard drink; 1–1.9 standard drinks; ≥2 standard drinks) and physical activity (based on the Global Physical Activity Questionnaire (GPAQ),[34] responses were measured by the Metabolic Equivalent of Task,[35] and then categorised into tertiles).

Body mass index (BMI) was computed by dividing measured weight (kg) by squared measured height (m^2), which was then categorised as <18.5; 18.5–22.9; 23.0–24.9; ≥25.0 kg/m^2. Self-reported information on the presence of a previous diagnosis of severe disease (ie, diseases of the circulatory system and cancer) was also incorporated in the models (yes or no). These lifestyle-related and health-related variables were included in the subsequent statistical models to account for possible differences among the exposure categories in order to obtain more precise estimates.[13 34 36]

Statistical analysis

Multiple imputation was used to account for those with missing information on household income (n=33). Specifically, 20 data sets were created and the estimates were combined using Rubin's rule.[37]

To investigate the association between social capital and depressive symptoms, we used a multilevel Poisson regression model with a robust variance estimator.[38 39] We accounted for possible heterogeneity at the commune level (Level 1: individual and Level 2: commune). Three models were used in the analysis and were adjusted in the following manner. Model 1 was adjusted for age, and sex, while Model 2 was further adjusted for marital status, educational attainment, employment and household income. Model 3 was further adjusted for smoking, alcohol consumption, physical activity, BMI categories and a previous diagnosis of severe disease (ie, diseases of the circulatory system and cancer). Results are reported as prevalence ratios (PRs) with corresponding 95% confidence intervals (CIs).

To test the robustness of the study findings, we conducted sensitivity analyses where (1) we examined the association between social participation in community groups/organisations that were vertical and horizontal in nature, ie, professional/economic groups (political/trade union organisations; cooperatives; women's unions; farmers' associations; veterans' associations, credit groups/life insurance groups) or non-professional/non-economic groups (religious groups and sports groups) and depressive symptoms and (2) we examined the association between each of the four components of cognitive social capital and depressive symptoms.

All the statistical analyses were conducted using Stata V.15.0 (College Station, Texas, USA). Statistical significance was set at p<0.05 (two-tailed).

Patients and public involvement

Patients and the public were not involved in this study.

RESULTS

Table 1 shows the basic characteristics of the study participants. The mean age (SD) was 49.9 (5.5) years old with a higher age observed among those with versus without structural social capital. Women comprised 61.3% of the participants. Almost 90% of the respondents were married and nearly one-quarter (23.9%) of them had finished high school or undertaken further education. Household income was higher among those with higher social capital. Those who currently smoked and those who drank equal to or more than two standard drinks of alcohol per day comprised 20.5% and 8.9% of the participants, respectively.

Using the CES-D, 11.4% of the study participants (341 out of 3000) were categorised as having depressive symptoms. Table 2 shows the results of a multilevel Poisson regression analysis with a robust variance estimator investigating the association between social capital indicators and depressive symptoms. Compared to those in the lowest cognitive social capital category, those in the middle and highest categories were less likely to exhibit depressive symptoms (Model 1; middle: PR=0.56, 95% CI=0.46 to 0.70; high: PR=0.39, 95% CI=0.31 to 0.48). These associations remained statistically significant even after adjusting for the covariates (Models 2 and 3). As for structural social capital, we also found statistically significant associations across the three models (PR=0.70, 95% CI=0.56 to 0.86 in Model 1 and PR=0.74, 95% CI=0.61 to 0.90 in Model 2 and Model 3).

In the sensitivity analysis where we examined the association in relation to social participation in

Table 1 Basic characteristics of the study participants in the Khánh Hòa Cardiovascular Study, Vietnam (2019–2020)

Variables	All Participants	Cognitive social capital			Structural social capital	
		Low	Middle	High	No	Yes
		(n=931)	(n=1023)	(n=1046)	(n=1876)	(n=1124)
Age, years (mean (SD))	49.9 (5.5)	49.9 (5.5)	49.7 (5.5)	50.1 (5.6)	49.7 (5.5)	50.2 (5.6)
Female, n (%)	1840 (61.3)	585 (62.8)	617 (60.3)	638 (61.0)	1120 (59.7)	720 (64.1)
Married/cohabiting, n (%)	2691 (89.7)	837 (89.9)	910 (89.0)	944 (90.3)	1696 (90.4)	995 (88.5)
Education, n (%)						
Less than primary school	352 (11.7)	141 (15.1)	95 (9.3)	116 (11.1)	251 (13.4)	101 (9.0)
Primary school	863 (28.8)	270 (29.0)	327 (32.0)	266 (25.4)	577 (30.7)	286 (25.4)
Junior high school	1068 (35.6)	345 (37.1)	364 (35.6)	359 (34.3)	690 (36.8)	378 (33.6)
High school and higher	717 (23.9)	175 (18.8)	237 (23.2)	305 (29.2)	358 (19.1)	359 (32.0)
Employment, n (%)						
Government employee	295 (9.8)	61 (6.6)	105 (10.3)	129 (12.3)	100 (5.3)	195 (17.4)
Non-government employee	483 (16.1)	158 (17.0)	173 (16.9)	152 (14.5)	341 (18.2)	142 (12.6)
Self-employed	595 (19.8)	176 (18.9)	200 (19.6)	219 (20.9)	359 (19.1)	236 (21.0)
Farmer/Fisher	870 (29.0)	284 (30.5)	302 (29.5)	284 (27.2)	600 (32.0)	270 (24.0)
Homemaker	527 (17.6)	182 (19.6)	171 (16.7)	174 (16.6)	348 (18.6)	179 (15.9)
Others	111 (3.7)	44 (4.7)	36 (3.5)	31 (3.0)	70 (3.7)	41 (3.7)
Unemployed/retired	119 (4.0)	26 (2.8)	36 (3.5)	57 (5,5)	58 (3.1)	61 (5.4)
Household income, n (%)						
Low	1002 (33.4)	333 (35.8)	307 (30.0)	362 (34.6)	694 (37.0)	308 (27.4)
Middle	1045 (34.8)	334 (35.9)	379 (37.1)	332 (31.7)	649 (34.6)	396 (35.2)
High	920 (30.7)	253 (27.2)	323 (31.6)	344 (32.9)	515 (27.5)	405 (36.0)
Missing	33 (1.1)	11 (1.2)	14 (1.4)	8 (0.8)	18 (1.0)	15 (1.3)
Smoking, n (%)						
Never smoking	2036 (67.9)	646 (69.4)	690 (67.5)	700 (66.9)	1225 (65.3)	811 (72.2)
Past smoking	350 (11.6)	88 (9.5)	121 (11.8)	141 (13.5)	227 (12.1)	123 (10.9)
Current smoking	614 (20.5)	197 (21.2)	212 (20.7)	205 (19.6)	424 (22.6)	191 (16.9)
Alcohol consumption, n (%)						
0 standard drinks	2114 (70.5)	663 (71.2)	721 (70.5)	730 (69.8)	1302 (69.4)	812 (72.2)
0.1–0.9 standard drinks	416 (13.9)	137 (14.7)	150 (14.7)	129 (12.3)	273 (14.5)	143 (12.7)
1–1.9 standard drinks	201 (6.7)	56 (6.0)	57 (5.6)	88 (8.4)	118 (6.3)	83 (7.4)
≥2 standard drinks	269 (8.9)	75 (8.1)	95 (9.3)	99 (9.5)	183 (9.8)	86 (7.7)
Total METs, n (%)						
Low	1030 (34.3)	360 (38.7)	323 (31.6)	347 (33.2)	658 (35.1)	372 (33.1)
Middle	975 (32.5)	343 (36.8)	361 (35.3)	271 (25.9)	589 (31.4)	386 (34.3)
High	995 (33.2)	228 (24.5)	339 (33.4)	428 (40.9)	629 (33.5)	366 (32.6)
Body mass index, n (%)						
<18.5	139 (4.6)	48 (5.2)	47 (4.6)	44 (4.2)	98 (5.2)	41 (3.7)
18.5–22.9	1344 (44.8)	412 (44.3)	435 (42.5)	497 (47.5)	865 (46.1)	479 (42.6)
23.0–24.9	739 (24.6)	228 (24.5)	255 (24.9)	256 (24.5)	448 (23.9)	291 (25.9)
≥25.0	778 (25.9)	243 (26.1)	286 (28.0)	249 (23.8)	465 (24.8)	313 (27.8)
Previous diagnosis of a serious diseases*, n (%)	175 (5.8)	61 (6.6)	64 (6.3)	50 (4.8)	104 (5.5)	71 (6.3)

*Cancer and/or diseases of the circulatory system
METs, Metabolic Equivalent of Task.

different types of community groups/organisations, participating in both professional/economic groups and in non-professional/non-economic groups was not statistically significant, although the associations trended in the same direction. More specifically, in the fully adjusted Model 3, the PR was 0.74 (95% CI=0.45 to 1.20) for professional/economic groups, while the corresponding figure was 0.80 (95% CI=0.58 to 1.09) for non-professional/non-economic groups (table 3). When we examined the association between each of the four types of cognitive social capital and depressive symptoms, we observed significant

Table 2 Results of Poisson regression analyses with a robust variance estimator investigating the associations between individual-level social capital and depressive symptoms among participants in the Khánh Hòa Cardiovascular Study, Vietnam (2019–2020)

	Number of participants with/without depressive symptoms	Model 1		Model 2		Model 3	
		PR	95% CI	PR	95% CI	PR	95% CI
Cognitive social capital							
Low	142/789	1	Ref.	1	Ref.	1	Ref.
Middle	101/922	0.56	0.46 to 0.70	0.59	0.48 to 0.74	0.59	0.49 to 0.71
High	98/948	0.39	0.31 to 0.48	0.39	0.31 to 0.49	0.39	0.31 to 0.48
Structural social capital							
No	238/1638	1	Ref.	1	Ref.	1	Ref.
Yes	103/1021	0.70	0.56 to 0.86	0.74	0.61 to 0.90	0.74	0.61 to 0.90

The associations in relation to cognitive social capital and structural social capital were examined separately. Model 1 was adjusted for age and sex. Model 2 was further adjusted for education, marital status, employment and household income. Model 3 included the same variables as in Model 2 and also included current smoking, alcohol consumption, physical activity, body mass index and self-reported history of a serious disease (ie, cancer and/or diseases of the circulatory system).
PR, prevalence ratio; Ref, reference category.

inverse associations for all four domains, for example, PR=0.61 (95% CI=0.50 to 0.74) for trust in the fully adjusted Model 3 (table 4).

DISCUSSION

In this cross-sectional study of 3000 middle-aged community dwellers in Khánh Hòa, Vietnam, we observed a statistically significant association between social capital and depressive symptoms. More specifically, both cognitive and structural social capital were inversely associated with the prevalence of depressive symptoms after adjusting for socio-demographic, lifestyle-related and health-related covariates.

Our finding that cognitive social capital was inversely associated with the prevalence of depressive symptoms is consistent with the results of systematic reviews by De Silva *et al*[6] and Ehsan and De Silva.[7] In an earlier study in Vietnam,[40] cognitive social capital (trust, social harmony, perceived fairness and a sense of belonging) was found to be inversely associated with depressive symptoms, although the participants in that study were solely the mothers of 1-year-old children. While few individual studies in other LMICs have reported a positive association in relation to cognitive social capital,[11] the results of the current study provide support for the assertion that the association between cognitive social capital and depression/depressive symptoms is robust. It should also be noted that each of the four domains of cognitive social capital was inversely associated with depressive symptoms in this study.

We also found a significant association in relation to structural social capital, which was operationalised as social participation in this study. Although previous studies have hypothesised that social participation affects health through the diffusion of health behaviours and by providing a buffer against psychological stress,[25] the

Table 3 The associations between structural social capital (divided into professional, economic groups and non-economic groups) and depressive symptoms among participants in the Khánh Hòa Cardiovascular Study, Vietnam (2019–2020)

	Number of participants with/without depressive symptoms	Model 1		Model 2		Model 3	
		PR	95% CI	PR	95% CI	PR	95% CI
Professional and economic groups							
No	310/2335	1	Ref.	1	Ref.	1	Ref.
Yes	31/324	0.63	0.47 to 0.85	0.73	0.46 to 1.20	0.74	0.45 to 1.20
Non-professional and non-economic groups							
No	258/1877	1	Ref.	1	Ref.	1	Ref.
Yes	83/782	0.79	0.58 to 1.09	0.80	0.59 to 1.10	0.80	0.58 to 1.09

Professional/economic groups included professional/trade union organisations, cooperatives, women's unions, farmers' associations, veterans' associations and credit groups/life insurance groups. Non-professional/non-economic groups comprised religious groups and sports groups. Model 1 was adjusted for age and sex. Model 2 was further adjusted for education, marital status, employment and household income. Model 3 included the same variables as in Model 2 and also included current smoking, alcohol consumption, physical activity, body mass index and self-reported history of a serious disease (ie, cancer and/or diseases of the circulatory system).
CI, confidence interval; PR, prevalence ratio; Ref, reference category.

Table 4 The associations between each element of individual-level cognitive social capital and depressive symptoms among participants in the Khánh Hòa Cardiovascular Study, Vietnam (2019–2020)

	Number of participants with/without depressive symptoms	Model 1		Model 2		Model 3	
		PR	95% CI	PR	95% CI	PR	95% CI
Trust	187/1608	0.59	0.49 to 0.72	0.61	0.49 to 0.75	0.61	0.50 to 0.74
Good relationships within the commune	190/1746	0.51	0.43 to 0.60	0.52	0.43 to 0.62	0.51	0.44 to 0.60
Feeling attached to the commune	190/1880	0.43	0.37 to 0.49	0.43	0.38 to 0.50	0.43	0.38 to 0.49
Not feeling exploited	324/2063	0.61	0.53 to 0.72	0.66	0.56 to 0.78	0.59	0.51 to 0.67

The reference categories for each variable were: individuals who did not trust people in the same commune, individuals who perceived the relationships in the commune to be bad, individuals who did not feel attached to the commune and individuals who felt exploited by others. Each variable was incorporated separately in the analysis. Model 1 was adjusted for age and sex. Model 2 was further adjusted for education, marital status, employment and household income. Model 3 included the same variables as in Model 2 and also included current smoking, alcohol consumption, physical activity, body mass index and self-reported history of a serious disease (ie, cancer and/or diseases of the circulatory system).

CI, confidence interval; PR, prevalence ratio.

associations between social participation and depression/depressive symptoms have been inconsistent. For example, while Bassett and Moore reported a significant association among Canadian adults aged 25–75 years old,[41] other studies conducted in China[42] and South Africa[43] did not find any evidence of a significant association. In addition, Amegbor *et al*[10] rather reported that among older adults in Ghana those who engaged in club/group meetings, worked with neighbours and engaged in social outings were more likely to have depressive symptoms. A possible reason for these differing results across studies might relate to whether the positive benefits of social participation outweigh the negative impact of the social burden associated with financial/non-financial demands that can come from other members in the same community. Given that we observed an inverse association between structural social capital and depressive symptoms (even when we categorised social participation into participation in community groups characterised by vertical relationships or by horizontal relationships where the results were not statistically significant), it suggests that rural Vietnam might be a setting where the negative impact of social participation may be less likely to emerge.

It should also be noted that some other studies used different indicators of structural social capital (eg, social networks,[42] contact with friends and neighbours[44]) and reported an inverse association in relation to depression/depressive symptoms. For example, Cao *et al*[42] reported a significant association in relation to participants' social networks (assessed in terms of network diversity) but not in relation to social participation, both of which were aspects of the same construct (ie, structural social capital). Given this, the way structural social capital is assessed may also affect the social capital-depression association. While our study reported an inverse association between structural social capital and depressive symptoms, we cannot discount the possibility that there might also be other indicators which capture the negative effects of social interactions with others in our study location.

As mentioned earlier, we found that both cognitive and structural social capital were inversely associated with depressive symptoms. As yet, there has been comparatively little research that has examined different types of social capital in relation to depressive symptoms, and the studies that have been undertaken have produced mixed results.[42 45–48] While some studies have reported inverse associations for both structural and cognitive social capital within single studies,[44] other studies have found inconsistent associations across different definitions of social capital.[10 42 49] In the above-mentioned study by Amegbor *et al*[10] that was conducted in Ghana an inverse association was reported for cognitive social capital and structural social capital as defined by participating in public meetings and socialising with coworkers, but a positive association was found for structural social capital defined as frequently engaging in club/group meetings, working with neighbours and engaging in social outings. In addition, Chen *et al*[45] reported inverse associations for bonding and bridging social capital, but a positive association between social relationships as characterised by engaging in unhealthy behaviours with others (eg, drinking, smoking and reading pornographic books) and depression in urban China. Specific behaviours/information which can be diffused via a network as a result of social capital and the way people perceive such social capital (which can differ depending on age, sex, socioeconomic status and culture)[16] may also affect the social capital-depression association.

Strengths and limitations

This study has several strengths. First, we were able to obtain and examine information on a wide range of variables including socio-demographic factors, and respondents' health-related and lifestyle-related factors as well

as their medical history. By adjusting the analysis for a variety of possible confounders, we were able to estimate robust effect sizes for social capital in relation to depressive symptoms. Second, our study is one of the few studies on this association that has been conducted in LMICs. By investigating the association among the general population in rural communities, our study has highlighted the possible role of social capital in mitigating the disease burden associated with depression in LMICs, which has been reported to be high.[14 50]

Despite the strengths listed above, there are several limitations that should be acknowledged. First, while we employed a set of questions on social capital that were previously used in Vietnam, it is possible that other important aspects of social capital might exist in Vietnam, such as the role of 'Hương Ước' (village regulations)[51] which were not examined in the current study. Second, as social capital and depressive symptoms were both measured using a questionnaire, the responses might have been affected by common methods bias. Third, while the 20-item CES-D has been previously validated in Vietnam,[52] the 11-item CES-D has not been. Fourth, the cross-sectional design of the current study does not allow us to infer any causal relationships. It is possible that depression may have led to lower social capital, that is, depressed individuals may have been less likely to participate in community organisations. Future research should be conducted to examine whether the associations observed in this study can also be obtained longitudinally. Fifth, our study participants might not have been fully representative of the Vietnamese population in some ways given that they reside in rural communities in one province and were middle-aged. Thus, caution should be exercised when generalising the study findings to other populations.

CONCLUSIONS

This cross-sectional study among rural communities in Khánh Hòa province, Vietnam, showed that individual-level cognitive and structural social capital had an inverse association with the prevalence of depressive symptoms after adjusting for a variety of confounders. Longitudinal research is now required to determine if higher social capital can prevent the onset of depressive symptoms among residents in both rural and urban areas in Vietnam.

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Contributors All authors contributed to the conception, design and interpretation of the data. ADD, YI, AF and DVHo contributed to the data analysis. TTPP, CQN, DCP, DVHu, HXL and DTH contributed to the acquisition of the data. ADD, YI, AF, AS and AY drafted the manuscript. TTPP, CQN, DCP, MH, DVHu, HXL, DTH, MJ and TM contributed to the critical revision of the manuscript. ADD, YI, AF, AY, TTPP, CQN and DVHo had full access to all the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis. All authors have read and approved the final manuscript.

Funding This study was financially supported by the National Center for Global Health and Medicine (19A06, 22A02), the Pfizer Health Research Foundation (award number: N/A) and the Japan Society for the Promotion of Science (KAKENHI JP19K20536, JP21J01171, JP21K17301). These funders had no role in the study design, execution of the study, statistical analyses, interpretation of the data or decision to submit the manuscript for publication.

Competing interests None declared.

Patient and public involvement Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

Patient consent for publication Not applicable.

Ethics approval The study procedure was approved by the Research Ethics Committee at the National Center for Global Health and Medicine (NCGM) (approval number: NCGM-G-003172-03) and equivalent committees at the University of Tokyo (2021007NI) and the Pasteur Institute in Nha Trang, Vietnam (02/2019/HDDD-IPN). Participants gave informed consent to participate in the study before taking part.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement Data are available upon reasonable request. Correspondence should be addressed to Yosuke Inoue (yosuke.yoshi.yosky@gmail.com).

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