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SPECIAL ISSUE PAPER

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The impact of residential immobility and population turnover on the support networks of older people living in rural areas: Evidence from CFAS Wales

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Abstract

This article addresses two questions: Are "stayers"—defined as older people who were born in an area and lived there for 25 years or more prior to interview—more likely to have locally integrated or family dependent networks than other types of networks in the 21st century? Does population turnover influence the support networks of older people more strongly than being a "stayer"? A sample of 1,870 participants living in rural areas is drawn from cross-sectional (Wave 1) data (version 2) from the Cognitive Function and Ageing Study (CFAS Wales). Five multinomial logistic regression models are used to establish how demographic covariates, cumulative population turnover, inflow, outflow, and stayer influence membership of family dependent, locally integrated, local self-contained, wider community focused, and private restricted support networks. The results reveal significant differences in the distribution of network types between stayers and non-stayers. Stayers were more likely to have locally integrated or family dependent networks and were less likely to have wider community focused or private restricted networks than non-stayers. Gender, marital status, education, disability, childlessness, area deprivation, and cumulative population turnover, inflow, and outflow (by age group) also influence membership of different networks. The research has implications for planning of formal services in rural places characterised by "ageing in place" or as "ageing places" and comprising socially engaged and socially marginalised networks. In particular, providers of social care should take into account the different types of support that may be required to bolster socially marginalised support networks.

KEYWORDS

ageing in place, ageing places, informal carers, older people, rural, support networks

1 | INTRODUCTION

The combination of declining fertility and mortality rates and the increases in life expectancy has meant that European populations are becoming increasingly weighted toward older age groups. Although it is anticipated that rural population will decrease in size, the proportion of older people in rural areas compared to urban areas will be greater due to the out-migration of younger people and/or the in-migration of retirees (Burholt & Dobbs, 2012). A review of the international literature published on rural ageing research over the last decade concluded that rural ageing had been neglected. In particular, few papers focused on the structure and function of family relationships of older people in rural areas (Burholt & Dobbs, 2012). Some research has explored family dispersion linking demography, migration, and rural ageing, focusing on the resilience of many rural families who retain emotional intimacy at distance (Keeling, 2001; Scharf, 2001). However, there is very little research on ageing in rural places and the experiences of older "stayers." This is important, as proximal networks may reduce pressures on formal service providers through intergenerational or intragenerational exchange of informal support. For example, an older person in poor physical or cognitive health may receive help with activities of daily living from family members or friends, while young parents may rely on

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local grandparents to provide childcare in order to enter paid employment (Keating, Kwan, Hillcoat-Nalletamby, & Burholt, 2015).

It has been suggested that the smaller size of communities in rural areas facilitates a greater degree of interaction with friends and promotes a stronger sense of belonging (Krout, 1988). However, Keating and Phillips (2008) have argued that there is little systematic evidence of how features of rural communities might structure rural life.

For more than 30 years, the role of social support has been one of the most widely researched areas in social gerontology (Goodwin, 2006). Social networks are the configuration of family, friends, and neighbours to whom older adults have social ties. People within a social support network have the potential to provide support to each other (Gray, 2009). Thus, the social network is wider than the support network, the latter comprising the subset of social network members that provide or receive informational, functional, or emotional support with everyday tasks (Wenger & Keating, 2008). The caring network is a subset of the support network that provides emotional or functional support to older people with physical or cognitive limitations (Keating & Dosman, 2009).

At the turn of the century, evidence suggested that around 80% of older people who received domestic support, relied entirely on help from informal carers and only one tenth relied exclusively on formal services (Pickard, Wittenberg, Comas-Herrera, Davies, & Darton, 2000). More recent estimates suggest that more than 6.4 million adults in the United Kingdom (12% of the adult population) are carers and that by 2037, this will increase to 9 million (Buckner & Yeandle, 2011). Some research has suggested that the greater availability of informal support in rural areas contributes to lower levels of institutionalisation when compared to urban areas (McCann, Grundy, & O'Reilly, 2014). However, a broad definition of "rural" that does not differentiate between settlement types perpetuates the myth of the rural idyll (Short, 1991) depicting rural areas as homogenous and more supportive than urban areas. There is little current research on the impact of residential (im) mobility or population change in rural areas on the availability of proximal kin and the support networks of older people.

One of the first studies of social support networks of older adults in the United Kingdom (UK) was conducted in a rural area of North Wales. The Bangor Longitudinal Study of Ageing spanned 20 years (1979–1999) and collected data on the availability and provision of support from family, friends and neighbours. The Practitioner Assessment of Network Type (PANT) was used to classify participants to one of five networks: locally integrated (LI), family dependent (FD), local self-contained (LSC), wider community focused (WCF), and private restricted (PR; Wenger, 1991) (Table 1).

The Bangor Longitudinal Study of Ageing and other studies found that that LI support networks and FD networks were usually associated with long-term residence in an area (Wenger & St Leger, 1992). LI networks were typified by local family and friends, and high levels of engagement with community groups. It was assumed that prolonged residence within a community allowed local relationships with friends and neighbours to flourish and that local embeddedness contributed to community integration. Furthermore, the availability of local kin within these networks suggested that families had not migrated (Wenger, 1991).

Local kin were also important for the FD networks, within which proximal relatives met most support needs. These networks were often in response to the poor health of an older person. FD networks comprised few peripheral friends and neighbours, community involvement was low, and networks were smaller than average. They were more prevalent in farming communities with a low population turnover of older people, that is, most older people with these networks had lived in the area all their lives (Wenger & St Leger, 1992).

TABLE 1 Descriptions of network types and relationship to population turnover, long-term residence and migration

Network type	Description	Population turnover and migration
Family dependent	• proximal relatives meet most support needs • often shared household, or close to an adult child • few peripheral friends and neighbours • community involvement low • networks smaller than average • in response to the poor health (and widowhood) of an older person	• long-term residence • population stability • families have not migrated
Locally integrated	• close relationships with local with family and friends • friends also neighbours • high levels of engagement with community groups • networks larger than average	• long-term residence • families have not migrated
Local self-contained	• arms-distance relationships with kin residing in an adjacent community • reliance on neighbours • low levels (if any) of engagement with community groups • associated with childlessness • relationships with nieces or nephews substitute for children • networks smaller than average	• none
Wider community focused	• proliferation of local friends • active relationships with distant kin • high salience of friends and neighbours • high levels of engagement in community organisations and voluntary groups • networks larger than average	• retirement destinations rather than stable communities
Private restricted	• absence of local kin or friends • little contact with neighbours • low involvement in community groups • networks smaller than average • may be due to poor health or lifelong low levels of social contact	• retirement destinations rather than stable communities

While the rural network research in the 1990s demonstrated that LI and FD networks were based on population stability, spatial analysis of network types found that WCF and PR networks were more likely to be found in popular retirement destinations rather than in stable communities (Wenger & St Leger, 1992). WCF networks were typified by a proliferation of local friends but distant kin (greater than 50 miles away), and older people with these types of networks were engaged in community activities, organisations, and voluntary groups. PR networks were associated with the absence of local kin or friends. Older people with these networks had little contact with neighbours and low involvement in community groups. PR networks resulted from withdrawal from community involvement because of poor health or reflected a lifelong experience of low levels of social contact (Wenger, 1991).

The LSC network has not traditionally been associated with long-term residency or relocation. LSC networks were a relatively rare configuration of relationships and were often associated with childlessness. People with these networks often had arms-distance relationships with kin residing in an adjacent community and often developed relationships with nieces or nephews to substitute for children (Wenger, 1991).

A majority of research using the PANT has assumed that the characteristics associated with network types have remained stable over time. However, there have been substantial social changes over the last two decades that could challenge this assumption. Changing working practices (including increased female participation in the labour force), local employment opportunities, and geographical mobility of the labour force may have resulted in fewer proximal kin, while increases in population turnover may have influenced local neighbourliness or social cohesion. There are likely to be differences between "ageing in place" (older people staying in the communities of origin) and "ageing places" (communities that have a growing population of older migrants; Skinner et al., 2014). Moreover, within rural areas typified by ageing in place or as ageing places, there may be different degrees of marginalisation (ageing with few financial or health resources) or social participation and social engagement (Keating, Swindle, & Fletcher, 2011) that manifest in the distribution of support networks.

In this article, we view older people within their rural networks as both potential recipients and providers of support to family and community members (Keating et al., 2015). Moreover, we recognise that rural communities can change, and the extent to which people may provide or receive support may be dependent on local social cohesion, neighbourliness, and familiarity with the local population (Burholt, Curry, Keating, & Eales, 2014). In order to advance our understanding of support networks in later life, we examine the influence of residential history (that is, being a stayer within a rural community) and the dynamic reconstitution of place on the configuration of relationships. This article addresses two questions:

> *Are "stayers"—defined as people who were born in an area and lived there for 25 years or more prior to interview—more likely to have locally integrated or family dependent networks than other types of networks in the 21st century? Does population turnover influence the support networks of older people more strongly than being a "stayer"?*

We explore whether in 2012–2014, an older person's configuration of family, friends, and neighbours and community participation (their network type) is dependent on being born and remaining in a rural area and/or is a product of local population change.

2 | DESIGN AND METHODS

2.1 | Study sample

The Cognitive Function and Ageing Study (CFAS Wales) is a longitudinal study looking at health and cognitive function in older people in Wales. It is a national representative study of community dwelling people aged 65 and older. Data for this article are drawn from cross-sectional (Wave 1) data (version 2) from CFAS. Participants were randomly sampled from primary care registration lists in three local authorities in Wales, UK: Neath Port Talbot, Gwynedd, and Anglesey (Matthews et al., 2013). The latter two local authorities were selected as they were CFAS-I sites (1993/19950) the former as it adds greatly to the mix of social and cultural diversity. Sampling was stratified according to age group (65–74 years: ≥75 years). Prior to contacting selected participants, primary care practices records were screened for death, terminal illness, or violent behaviour. Interviewers received intensive 3-day training to deliver the standardised interviews (Matthews et al., 2013). The first wave of interviewing commenced in 2012 and was completed in 2014.

Computer-assisted personal interviews were conducted in participants' homes through the medium of English and Welsh. In total, 3,593 interviews were conducted with participants aged 65 and older. The response rate was 46%. This article is based on a sample of 1,870 participants living in rural areas, that is, classified as rural towns and fringes or rural villages and dispersed areas in the 2011 Rural Urban Classification (Bibby & Brindley, 2013), with no missing data on the variables used in the analysis.

The average age of participants was 74.5 years (SD = 6.87), and they had on average completed 12.27 years (SD = 4.77) of full-time education. Participants were predominantly female (n = 1,001; 53.9%). The majority of the participants were married (n = 1,193; 63.8%) and around one quarter were widowed (n = 473; 25.3%). Few participants were divorced or separated (n = 124; 6.6%) or had never married (n = 80; 4.3%). Of the rural dwelling sample, 224 (12%) were childless.

To account for nonresponse, we controlled for age, gender, marital status, education, and area deprivation to derive robust estimates of confidence intervals for the coefficients in the models tested below. In addition, in order to examine the effects of stayers and population turnover on network membership, we controlled for disability and childlessness that elsewhere have demonstrated a strong association with the dependent variable (Wenger, Scott, & Patterson, 2000; Wenger & St Leger, 1992).

2.2 | Measures

2.2.1 | Independent variables

Variables representing stayer and population turnover were included in the models as independent variables. Stayer was imputed from two variables: born in the region and length of residence. First, born in the region was imputed from free text responses to the question, "Where were you born." Data were manually recoded as 1 "born in the region" and 0 "not born in the region." The "region" was defined by the interview location, thus, in North Wales comprised two

counties (Gwynedd and Ynys Mon) and in South Wales comprised only one local authority area (Neath Port Talbot). The second variable used to impute stayer asked participants how long they had lived in the area and was coded 1 "1–4 years," 2 "5–9 years," 3 "10–14 years," 4 "15–19 years," 5 "20–24 years," 6 "25+ years," and 7 "a long time." Participants who were both born in the region and had lived in the area for 25 years or longer, or "a long time" were categorised as stayers: 1 "yes" and 0 "no."

Cumulative population inflow was imputed for Middle Super Output Areas (MSOA). It was calculated as the sum of inflow per 1,000 persons across 10 data time points, that is, at yearly intervals from mid-2001 to mid-2010. Cumulative population inflow was similarly calculated separately for five age band 1–14 years; 15–24 years; 25–44 years; 45–64 years; and 65+ years over the 10 time points.

Cumulative population outflow and cumulative population outflow by age groups were imputed for MSOA in the same manner as for inflow, substituting figures for outflow per 1000 population.

Cumulative population turnover was imputed for MSOA as the sum of inflow and outflow per 1000 persons across 10 data time points. Cumulative population turnover was calculated separately for the five age bands representing cumulative inflow plus outflow per 1000 population in each group over the 10 time points.

2.2.2 | Dependent variable

Participants were assigned to one of the five social support networks using the eight-item PANT (Wenger, 1991). The eight questions and coded responses were as follows: (a) How far away, in distance, does your nearest child or other relative live? 0 "no relatives," 1 "same house/within 1 mile," 2 "1–5 miles," 3 "6–15 miles," 4 "16–50 miles," and 5 "50+ miles"; (b) If you have any children, where does your nearest child live? coded the same as (a); (c) If you have any living sisters or brothers, where does your nearest sister of brother live? coded the same as (a); (d) How often do you see any of your children or other relatives to speak to? 0 "never/no relatives," 1 "daily," 2 "2–3 times a week," 3 "at least weekly," 4 "at least monthly," 5 "less often"; (e) If you have friends in this community/neighbourhood, how often do you have a chat or do something with one of your friends? coded the same as (d); (f) How often do you see any of your neighbours to have a chat with or do something with? coded the same as (d); (g) Do you attend any religious meetings? coded 0 "no," 1 "yes, regularly," 2 "yes, occasionally"; and (h) Do you attend meetings of any community/neighbourhood or social groups, such as old people's clubs, lectures, or anything like that? coded the same as (g). Network types were calculated using the PANT algorithm. Participants that are borderline between two or more networks (e.g., they have the same scores) are allocated to the most likely network by the algorithm. Around 5% of any sample are unclassified (Wenger, 1995), and those unclassified participants are excluded from the analysis in this article. The five networks types are FD, LI, LSC, WCF, and PR (see Table 1).

2.2.3 | Covariates

Demographic covariates used in the analysis were gender (male/female), age (scale data), number of years of full-time education, marital status (never married, widowed, divorced or separated, and married), area deprivation (Townsend index of deprivation), limitations in activities of daily living (modified Townsend disability scale), and childlessness.

The Townsend index of deprivation uses variables derived from the UK census on unemployment, overcrowded households, car/van ownership, and home ownership. The score is calculated for Lower Super Output Areas (a geographical locale which contains on average 1,500 individuals but varies depending upon population density). A greater score implies a greater degree of area deprivation (Townsend, Phillimore, & Beattie, 1988). Analysis used quintiles of the Townsend index where 1 represents the least deprived quintile and 5 the most deprived quintile.

Limitations in activities of daily living were measured using the modified Townsend disability scale (Bond & Carstairs, 1982; Townsend, 1979). This scale consists of nine activities: cutting own toenails, washing all over or bathing, getting on a bus, going up and down stairs, heavy housework, shopping and carrying heavy bags, preparing and cooking a hot meal, reaching an overhead shelf, and tying a good knot in string. For each activity, participants were assigned a score of 2 if they needed help; 1 if they had some difficulty or used aids; and 0 if they had no difficulty. The scores for each item were summed (range 0–18; Melzer, McWilliams, Brayne, Johnson, & Bond, 2000).

2.3 | Analytical procedure

First, network type was used as the dependent variable (with LI—comprising the greatest number of participants—as the reference category) in a multinomial logistic regression (MLR) model to establish how demographic covariates were related to network type. The second model comprised the same covariates and dependent variable, but cumulative population turnover and stayer were introduced using a maximum likelihood stepwise entry method. The third model comprised the same covariates and dependent variable, with cumulative population turnover by age group and stayer entered using the same stepwise method. The fourth model comprised the same covariates and dependent variable, with cumulative population inflow by age group and stayer entered using the stepwise method. The fifth and final model comprised the same covariates and dependent variable, with cumulative population outflow and stayer entered using the stepwise method.

3 | RESULTS

The most frequent support networks observed in the sample were LI (31.9%, n = 596) and WCF (22.4%, n = 418). Fewer participants had FD (18.6%, n = 348), PR (17.3%, n = 323), or LSC (9.9%, n = 185) networks. The sample comprised 31.9% (n = 597) stayers and 68.1% (n = 1,273) non-stayers. There were significant differences between stayers and non-stayers in gender, disability, area deprivation, and network type. There were proportionally more women stayers (n = 346, 58.0%) than men (n = 257, 42.0%); $\chi 2$ (1, N = 1,870) = 5.95, $p \leq .05$. Mann–Whitney U tests showed that stayers' level of disability was significantly greater (ranked 978.40) than non-stayers (ranked

915.38); $z = -2.44$, $p \leq .05$. Stayers lived in areas ranked significantly more deprived (ranked 1,030.73) than in the areas that non-stayers lived (ranked 890.84); $z = -5.45$, $p \leq .001$. There were significantly differences in the distribution of network types between stayers and non-stayers (Figure 1); $\chi 2$ (4, N = 1,870) = 216.27, $p \leq .001$. Stayers were more likely to have LI (45.4%, n = 271) or FD (27.8%, n = 166) networks than non-stayers (LI 25.5, n = 325; FD 14.3, n = 182). Stayers were less likely to have WCF (8%, n = 48) or PR (7.9%, n = 47) networks than non-stayers (WCF 29.1%, n = 370; PR 21.7%, n = 276).

The Kruskal–Wallis H test showed that there was a statistically significant difference in cumulative population turnover χ^2 (4, N = 1,870) = 12.88, $p \leq .01$ and cumulative population inflow χ^2 (4, N = 1,870) = 13.50, $p \leq .05$ but not cumulative population outflow χ^2 (4, N = 1,870) = 9.24, $p > .05$ between the network types. The lowest mean rank scores for cumulative population turnover and inflow were observed for LI (906.21 and 905.07, respectively) and FD networks (871.79 and 870.30, respectively). Conversely, the highest mean rank scores for cumulative population turnover and inflow were observed for WCF (981.46 and 979.47, respectively) and PR networks (986.92 and 989.46, respectively).

In Table 2, based on the likelihood ratio test, some of the variables used in MLR modelling process were statistically significantly associated with network type (gender, marital status, education, disability, and childlessness). Only age and area deprivation did not contribute significantly to the overall fit of Model 1 (nor did they contribute to the fit of Models 2–5). Models 1–5 indicated that the stepwise addition of parameters significantly improved fit and convergence.

Table 2 shows a comparison of estimates of covariate effects of controls on network type expressed as relative risks for LSC, WCF, PR, and FD networks, respectively, with LI used as the reference category. The results of MLR shows that older women had approximately 0.6 to 0.7 times the relative risk of men for having a LSC (exp $\beta = 0.59$, $p \leq .01$), PR (exp $\beta = 0.55$, $p \leq .001$), or FD network (exp $\beta = 0.66$, $p \leq .01$) relative to LI networks. Older people in WCF networks compared to LI networks had a lower relative risk of being widowed (exp $\beta = 0.40$, $p \leq .01$) relative to married. Older people that were childless had more than twice the relative risk of participants with children of having LSC networks (exp $\beta = 2.38$, $p \leq .01$) and more than 6 times the relative risk of PR networks (exp $\beta = 6.05$, $p \leq .001$) relative to LI networks. Conversely, there was a lower risk of older people that were childless compared to those with children having FD networks (exp $\beta = 0.33$, $p \leq .001$) relative to LI networks. The risk of having FD networks (exp $\beta = 0.89$, $p \leq .05$) decreased as the number of years of full-time education increased relative to those in LI networks. Conversely, the risk of having LSC (exp $\beta = 1.01$, $p \leq .05$), WCF (exp $\beta = 1.05$, $p \leq .01$), or PR (exp $\beta = 1.04$, $p \leq .05$) networks increased as number of years of full-time education increased relative to those in LI networks. Furthermore, the risk of having LSC (exp $\beta = 1.03$, $p \leq .001$), PR (exp $\beta = 1.01$, $p \leq .05$), or FD (exp $\beta = 1.07$, $p \leq .001$) networks increased as level of disability increased relative to those in LI networks. Conversely, the risk of having WCF networks (exp $\beta = 0.96$, $p < .01$) decreased as level of disability increased relative to those in LI networks. Lastly, the risk of having a WCF network decreased (exp $\beta = 0.83$, $p < .01$) as area disadvantage increase relative to those in LI networks.

Model 2 included the forward (likelihood ratio) stepwise addition of variables related to nonmovers (stayers) in the locality, cumulative population turnover, cumulative population inflow, and cumulative population outflow. Only stayers made a significant contribution to the model and was entered into the model in Step 1. The contribution of the covariates to the model remain roughly the same as in Model 1 (Table 2), with the exception of the risk of having a PR network which was no longer significantly associated with the number of years of full-time education and the risk of having a WCF network which was no longer significantly associated with disability relative to those in LI networks. There was a lower risk of stayers having LSC (exp $\beta = 0.64$, $p \leq .05$), WCF (exp $\beta = 0.16$, $p \leq .001$), or PR networks (exp $\beta = 0.18$, $p \leq .001$) relative to LI networks. However, there were no

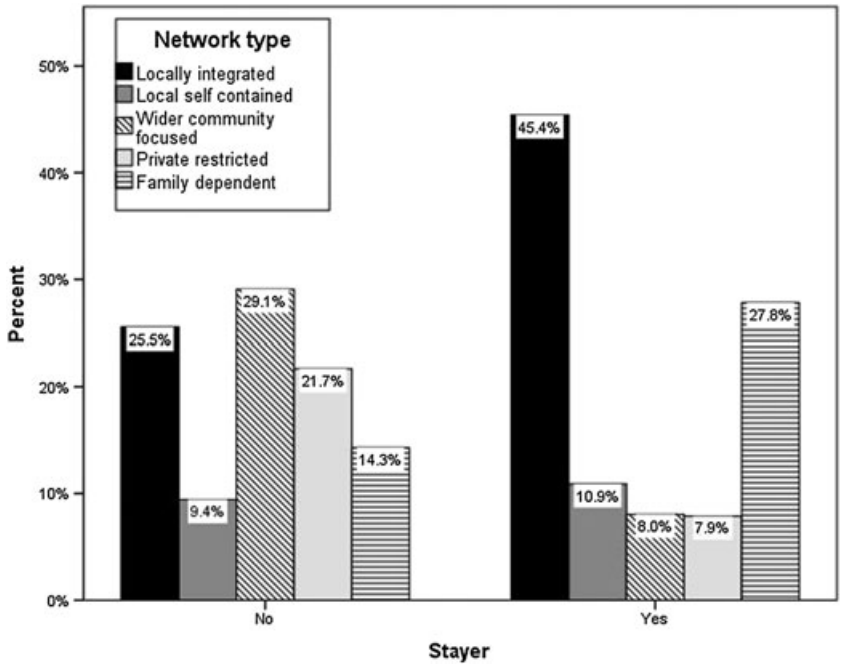

FIGURE 1 Distribution of network type for stayers (n = 597) and non-stayers (n = 1,273)

TABLE 2 Model 1, multinomial logistic regression estimates of covariate effects of controls on network type: Expressed as relative risks

	LSC vs. LI AOR (95% CI)	WCF vs. LI AOR (95% CI)	PR vs. LI AOR (95% CI)	FD vs. LI AOR (95% CI)
Age	0.98 (0.95–1.02)	1.00 (0.98–1.03)	1.00 (0.98–1.02)	0.99 (0.96–1.01)
Gender (female)	0.59 (0.41–0.84)**	1.05 (0.80–1.38)	0.55 (0.41–0.74)***	0.66 (0.50–0.88)**
Marital status				
Never married	0.64 (0.25–1.64)	0.52 (0.22–1.21)	0.51 (0.25–1.06)	1.93 (0.70–5.30)
Widowed	0.64 (0.40–1.02)	0.57 (0.40–0.81)**	0.85 (0.58–1.24)	1.01 (0.72–1.42)
Divorced[a]	0.63 (0.31–1.32)	0.73 (0.44–1.21)	1.12 (0.67–1.92)	0.60 (0.33–1.10)
Married	(ref)	(ref)	(ref)	(ref)
Education[b]	1.05 (1.01–1.09)*	1.05 (1.02–1.09)**	1.04 (1.00–1.08)*	0.94 (0.89–0.99)*
Disability	1.07 (1.03–1.12)***	0.96 (0.92–1.00)*	1.05 (1.01–1.09)*	1.07 (1.04–1.11)***
Childless	2.38 (1.30–4.37)**	1.50 (0.89–2.55)	6.05 (3.82–9.59)***	0.33 (0.15–0.75)**
Area disadvantage	0.86 (0.73–1.02)	0.83 (0.73–0.95)**	0.89 (0.78–1.03)	0.87 (0.76–0.99)*
AIC (intercept only)		5,574.54		
AIC		5,309.80		
Maximum 2log likelihood		$p \leq .001$		
Nagelkerke pseudo R^2		.14		

Notes. AIC = Akaike information criterion; AOR = adjusted odds ratio; CI = confidence interval; Est = estimated; FD = family dependent; LI = locally integrated; LSC = local self-contained; PR = private restricted; WCF = wider community focused.

[a]Or separated.

[b]Years full-time.

*$p \leq .05$;

**$p \leq .01$;

***$p \leq .001$.

significant differences for stayers in the risk of having FD networks relative to LI networks.

Table 3 reports the relative risk of network membership with the stepwise addition of variables relating to nonmovers (stayers) in the locality plus cumulative population turnover by age group. Stayers and cumulative population turnover in the oldest (65+ years) and youngest (1–14 years) age group made a significant contribution to the model and were entered into the model in Steps 1, 2, and 3, respectively. The contribution of the covariates to the model remain roughly the same as in Model 1 (Table 2), with the following exceptions: the risks of having LSC or PR networks were no longer significantly associated with the number of years of full-time education, and the risk of having WCF networks was neither significantly associated with disability nor area disadvantage relative to those in LI networks. Additionally, in this model, older people that were childless had 1.77 times the relative risk of participants with children of having WCF networks (exp β = 1.77, $p \leq .05$) relative to LI networks. As in Model 2, there was a similar lower risk of stayers having LSC, WCF, or PR networks relative to LI networks. In Model 3, the risk of having WCF networks (exp β = 1.00, $p \leq .001$) was decreased with an increased cumulative population turnover in the youngest age group (1–14 years), conversely the risk of having WCF (exp β = 1.01, $p \leq .001$), or PR (exp β = 1.00, $p \leq .01$) networks was increased with an increased cumulative population turnover in the oldest age group (65+ years).

In Models 4 and 5, we examined population movement in relation to inflow and outflow rather than cumulative turnover by age group, to further understand the impact of the wider community on network membership while taking into account long-term residence in the locality. Table 4 reports on Model 4 and the relative risk of network membership with the stepwise addition of variables relating to nonmovers (stayers) in the locality plus cumulative population inflow by age group. Stayers and cumulative population inflow in the age group comprising those 45–64 years and in the youngest (1–14 years) age group made a significant contribution to the model and were entered into the model in Steps 1, 2, and 3, respectively. The contribution of the covariates to the model remain roughly the same as in Model 1 (Table 2), with the following exceptions: The risk of PR networks was no longer significantly associated with the number of years of full-time education, and the risk of having WCF networks was neither significantly associated with disability nor area disadvantage relative to those in LI networks. As in Model 3, older people who were childless had a greater relative risk than participants with children of having WCF networks relative to LI networks. As in Models 2 and 3, there was a lower risk of stayers having LSC, WCF, or PR networks relative to LI networks. In Model 3, the risk of having WCF networks (exp β = 1.00, $p \leq .01$) was decreased with an increased cumulative population inflow in the youngest age group (1–14 years), conversely the risk of having WCF (exp β = 1.01, $p \leq .001$), or PR (exp β = 1.00, $p \leq .01$) networks was increased with an increased cumulative population inflow in the 45–64 years age group.

Table 5 reports on Model 5 and the relative risk of network membership with the stepwise addition of variables relating to nonmovers (stayers) in the locality plus cumulative population outflow by age group. Stayers and cumulative population outflow in the age group comprising those 65+ years, the youngest (1–14 years), and those 15–24 years made a significant contribution to the model and were entered into the model in Steps 1, 2, 3, and 4, respectively. The contribution of the covariates to the model remain roughly the same as in Model 1 (Table 2), with the following exceptions: The risk of

TABLE 3 Model 3, multinomial logistic regression estimates of covariate effects of controls, stayer and cumulative population turnover by age group from mid-2001 to mid-2010 on network type: Expressed as relative risks

	LSC vs. LI AOR (95% CI)	WCF vs. LI AOR (95% CI)	PR vs. LI AOR (95% CI)	FD vs. LI AOR (95% CI)
Age	0.98 (0.95–1.01)	1.00 (0.97–1.02)	0.99 (0.97–1.02)	0.99 (0.96–1.01)
Gender (female)	0.61 (0.42–0.87)**	1.09 (0.82–1.45)	0.58 (0.43–0.79)***	0.65 (0.49–0.87)**
Marital status				
Never married	0.61 (0.24–1.58)	0.48 (0.20–1.14)	0.50 (0.24–1.07)	1.98 (0.70–5.59)
Widowed	0.63 (0.39–1.01)	0.56 (0.39–0.81)***	0.80 (0.54–1.19)	1.01 (0.71–1.42)
Divorced[a]	0.63 (0.31–1.30)	0.67 (0.39–1.15)	1.03 (0.59–1.80)	0.60 (0.33–1.10)
Married	(ref)	(ref)	(ref)	(ref)
Education[b]	1.04 (1.00–1.08)	1.04 (1.01–1.08)*	1.03 (0.99–1.06)	0.94 (0.89–0.99)*
Disability	1.08 (1.03–1.12)***	0.98 (0.94–1.02)	1.07 (1.03–1.11)***	1.07 (1.04–1.11)***
Childless	2.56 (1.39–4.74)**	1.77 (1.02–3.09)*	7.29 (4.46–11.91)***	0.31 (0.13–0.73)**
Area disadvantage	0.92 (0.77–1.10)	0.99 (0.86–1.15)	1.06 (0.91–1.24)	0.85 (0.74–0.98)*
Stayer	0.66 (0.46–0.94)*	0.17 (0.12–0.24)***	0.19 (0.13–0.28)***	1.13 (0.86–1.49)
Population turnover				
Age 1–14 years	1.00 (1.00–1.00)	1.00 (1.00–1.00)***	1.00 (1.00–1.00)	1.00 (1.00–1.00)
Age 65+ years	1.00 (1.00–1.00)	1.01 (1.00–1.01)***	1.00 (1.00–1.01)**	1.00 (1.00–1.00)
AIC (intercept only)		5,762.29		
AIC		5,226.48		
Maximum 2log likelihood		$p \leq .001$		
Nagelkerke pseudo R^2		0.26		

Notes. AIC = Akaike information criterion; AOR = adjusted odds ratio; CI = confidence interval; Est = estimated; FD = family dependent; LI = Locally Integrated; LSC = local self-contained; PR = private restricted; WCF = wider community focused.

[a]Or separated.

[b]Years full-time.

*$p \leq .05$;

**$p \leq .01$;

***$p \leq .001$.

WCF and PR networks were no longer significantly associated with the number of years of full-time education, and the risk of having WCF networks was no longer significantly associated area disadvantage relative to those in LI networks. Additionally, in this model (as in Models 3 and 4), older people who were childless had a greater relative risk than participants with children of having WCF networks relative to LI networks. As in Models 2, 3, and 4, there was a lower (and roughly similar) risk of stayers having LSC, WCF, or PR relative to LI networks. In Model 5, the risk of having WCF networks (exp β = 1.00, $p \leq .001$) was decreased with an increased cumulative population outflow in the youngest age group (1–14 years), conversely the risk of having WCF (exp β = 1.00, $p \leq .05$) was increased with an increased cumulative population outflow in the 15–24 age group. Similarly, the risk of having PR (exp β = 1.01, $p \leq .01$) networks was increased with an increased cumulative population outflow in the older age group (65+ years).

4 | DISCUSSION

Support networks reflect different lifestyles and propensities to self-help and mutual aid (Wenger, 1993). In this study, a majority of older people living in rural areas have networks that are well-connected with either family or friends (LI, WCF, or FD). These networks encourage the development of reciprocal or mutual aid. However, more than one quarter (27.2%, n = 508) have networks that are less robust (LSC or PR). These networks have limited potential for mutual aid, and therefore self-help is critical. In the face of functional or cognitive impairment older people with either LSC or PR networks may require additional support from formal services. Some network types are related to being a stayer and population turnover. Consequently, the restructuring of rural areas has impacted on the experiences of rural inhabitants.

Stayers—those who were born in a rural area and lived there for more than 25 years—were more likely to have LI and FD networks than non-stayers. Furthermore, the contribution of stayer to network type membership was stable across all of the regression models, including those with population change. While it appears on the surface that cumulative population change does not outweigh the benefits of a lifetime residency in one community, it is worth remembering that LI networks were more common in stable communities. This suggests that population change may result in different geographical distributions of support network types.

Older nonmovers in stable rural populations had a greater likelihood of having LI networks than other types of networks (with the exception of FD networks). This mirrors the rural research conducted in the 1980s and 1990s that found LI support networks were usually associated with long-term residence. Our findings support a similar conclusion that prolonged residence within a community allows local relationships with friends and neighbours to flourish and that

TABLE 4 Model 4, multinomial logistic regression estimates of covariate effects of controls, born in region and cumulative population inflow by age group from mid-2001 to mid-2010 on network type: Expressed as relative risks

	LSC vs. LI AOR (95% CI)	WCF vs. LI AOR (95% CI)	PR vs. LI AOR (95% CI)	FD vs. LI AOR (95% CI)
Age	0.98 (0.95–1.01)	1.00 (0.98–1.02)	0.99 (0.97–1.02)	0.99 (0.96–1.01)
Gender (female)	0.61 (0.42–0.87)**	1.10 (0.83–1.46)	0.58 (0.42–0.79)***	0.66 (0.49–0.88)**
Marital status				
Never married	0.63 (0.25–1.64)	0.52 (0.22–1.25)	0.55 (0.26–1.17)	1.97 (0.70–5.54)
Widowed	0.63 (0.39–1.02)	0.57 (0.39–0.81)**	0.82 (0.55–1.21)	1.01 (0.71–1.42)
Divorced[a]	0.64 (0.31–1.32)	0.69 (0.41–1.17)	1.04 (0.60–1.82)	0.61 (0.33–1.11)
Married	(ref)	(ref)	(ref)	(ref)
Education[b]	1.04 (1.00–1.08)*	1.05 (1.01–1.08)*	1.03 (1.00–1.07)	0.94 (0.89–0.99)*
Disability	1.07 (1.03–1.12)***	0.97 (0.93–1.01)	1.06 (1.02–1.10)**	1.07 (1.04–1.11)***
Childless	2.54 (1.37–4.69)**	1.75 (1.00–3.04)*	7.05 (4.31–11.54)***	0.31 (0.14–0.73)**
Area disadvantage	0.92 (0.77–1.09)	0.94 (0.82–1.08)	1.05 (0.90–1.23)	0.86 (0.75–0.98)*
Stayer	0.66 (0.46–0.94)*	0.16 (0.12–0.23)***	0.19 (0.13–0.28)***	1.14 (0.87–1.50)
Population inflow				
Age 1–14 years	1.00 (1.00–1.00)	1.00 (1.00–1.00)**	1.00 (1.00–1.00)	1.00 (1.00–1.00)
Age 45–65 years	1.00 (1.00–1.01)	1.01 (1.00–1.01)***	1.01 (1.00–1.01)***	1.00 (1.00–1.00)
AIC (intercept only)		5,762.29		
AIC		5,232.74		
Maximum 2log likelihood		$p \leq .001$		
Nagelkerke pseudo R^2		0.26		

Notes. AIC = Akaike information criterion; AOR = adjusted odds ratio; CI = confidence interval; Est = estimated; FD = family dependent; LI = locally integrated; LSC = local self-contained; PR = private restricted; WCF = wider community focused.

[a]Or separated.

[b]Years full-time.

*$p \leq .05$;

**$p \leq .01$;

***$p \leq .001$.

local embeddedness contributes to community integration and involvement in local organisations. LI support networks are the most robust: rural stayers with these networks are well supported and at the lowest risk for isolation, depression, and institutionalisation (Wenger, 1997).

Long-term residence did not increase or decrease the likelihood of having a FD network (compared to have a LI network). Therefore, being a stayer is similarly important for the formation of FD networks. Previously, FD networks were described as those that have adapted to take into account the poor cognitive or functional health of the older person (Wenger, 1991). This appears to be the case today, as older people with greater levels of disability were more likely to have FD networks. Many studies have argued that in order to continue to live in the community, an older person in poor health requires support from proximal family (Pers, Kibele, & Mulder, 2015) and older people may relocate nearer to or into the same household as a family member in order to obtain adequate assistance (Golant, 2011; Longino, Jackson, Zimmerman, & Bradsher, 1991; Wilmoth, 2010). While there has been an abundance of research on the health-migration relationship, there is little research on stayers, health, and assistance. Our research suggests that older people with FD networks are as likely to be stayers as those with LI networks. Furthermore, there are no significant differences in turnover, inflow, or outflow in the rural populations in which these older people reside. This suggests that older people have not relocated to be near to their children nor vice versa, but that families have remained living in close proximity. As lower levels of education and higher area deprivation were related FD networks, these networks may be a rural working class adaptation to poor health. Family support and solidarity may have different patterns in different rural social groups (Broese van Gronenou, Glaser, Tomassini, & Jacobs, 2006), there may be lower levels of health literacy and subsequently poor access to services (Sudore et al., 2006) or fewer financial resources and less access to private care (Broese van Gronenou et al., 2006).

While the focus of this article is on rural stayers, we cannot ignore the associations observed between non-stayers, population turnover, and WCF and PR networks. First, there was a greater likelihood of membership to either network type for non-stayers. Second, WCF networks were related to low levels of area deprivation (in Model 1 only), increased outflow of 15–24 years, inflow of 45–64 years (preretirement migration) and population turnover of 65+ years. The rural areas where WCF networks are more prolific are characterised by out migration of young working age/university age populations, and an influx of preretirement migrants and churning of the population aged 65 years or more. Those with WCF networks are more likely to be migrants than stayers themselves, and to be involved in community activities, while not having any proximal kin. Third, the likelihood of PR network membership was related to increased inflow of 45–64 years (preretirement migration), turnover and outflow of those aged 65 years or more. Furthermore, PR networks were more likely for those that had greater levels of disability and who were childless. Whereas, we

TABLE 5 Model 5, multinomial logistic regression estimates of covariate effects of controls, born in region and cumulative population outflow by age group from mid-2001 to mid-2010 on network type: Expressed as relative risks

	LSC vs. LI AOR (95% CI)	WCF vs. LI AOR (95% CI)	PR vs. LI AOR (95% CI)	FD vs. LI AOR (95% CI)
Age	0.98 (0.95–1.01)	1.00 (0.98–1.02)	0.99 (0.97–1.02)	0.99 (0.96–1.01)
Gender (female)	0.61 (0.42–0.87)**	1.07 (0.80–1.42)	0.57 (0.42–0.78)***	0.66 (0.49–0.88)**
Marital status				
Never married	0.63 (0.24–1.63)	0.51 (0.21–1.22)	0.53 (0.25–1.13)	2.00 (0.71–5.66)
Widowed	0.63 (0.39–1.02)	0.55 (0.38–0.79)**	0.80 (0.54–1.18)	1.01 (0.71–1.42)
Divorced[a]	0.64 (0.31–1.31)	0.73 (0.43–1.24)	1.08 (0.62–1.88)	0.60 (0.33–1.11)
Married	(ref)	(ref)	(ref)	(ref)
Education[b]	1.04 (1.00–1.08)*	1.04 (1.01–1.08)	1.03 (0.99–1.07)	0.94 (0.89–0.99)*
Disability	1.07 (1.03–1.12)**	0.97 (0.94–1.01)*	1.07 (1.03–1.11)***	1.07 (1.04–1.11)***
Childless	2.54 (1.37–4.69)**	1.78 (1.02–3.11)*	7.21 (4.41–11.80)***	0.31 (0.13–0.71)**
Area disadvantage	0.89 (0.74–1.07)	0.98 (0.85–1.13)	1.06 (0.90–1.24)	0.84 (0.73–0.97)*
Stayer	0.64 (0.45–0.92)*	0.18 (0.12–0.25)***	0.20 (0.14–0.29)***	1.13 (0.85–1.49)
Population outflow				
1–14 decade	1.00 (1.00–1.00)	1.00 (0.99–1.00)***	1.00 (1.00–1.00)	1.00 (1.00–1.00)
15–24 decade	1.00 (1.00–1.00)	1.00 (1.00–1.00)*	1.00 (1.00–1.00)	1.00 (1.00–1.00)
65+ decade	1.00 (1.00–1.01)	1.01 (1.00–1.01)	1.01 (1.00–1.01)**	1.00 (1.00–1.01)
AIC (intercept only)		5762.29		
AIC		5218.15		
Maximum 2log likelihood		$p \leq .001$		
Nagelkerke pseudo R^2		0.27		

Notes. AIC = Akaike information criterion; AOR = adjusted odds ratio; CI = confidence interval; Est = estimated; FD = family dependent; LI = locally integrated; LSC = local self-contained; PR = private restricted; WCF = wider community focused.

[a]Or separated.

[b]Years full-time.

*$p \leq .05$;

**$p \leq .01$;

***$p \leq .001$.

have suggested that FD networks may be a working class adaptation to poor health, in this case, PR networks may be an adaptation from WCF networks in the face of poor health and fewer kin. While stayers may seek support from proximal family, non-stayers either relocate, or networks contract rendering the older person reliant on a spouse or formal care services for assistance in the face of poor health.

4.1 | Limitations and future directions

The research outlined in this article was conducted in Wales, UK, and the models should be tested with data from other countries and regions to ascertain the applicability in other cultural contexts. Moreover, the influence of type of rural area has not been assessed in these analyses. Although we differentiated between types of rural areas in the study (Bibby & Brindley, 2013), we could not include rural area type in the models. Bivariate analysis indicated a high degree of collinearity with cumulative population turnover $F(3, 1869) = 55.61$, $p < .001$; inflow $F(3, 1869) = 50.53$, $p < .001$; and outflow $F(3, 1869) = 61.42$, $p < .001$, whereby rural villages in dispersed and sparse areas demonstrated the greatest population change. Other research could examine older stayers in different rural communities in order to further understand the impact of rural places on social support networks (for example, taking into account differences in norms and expectations between types of rural communities rather than turnover).

There were some limitations concerning the measurements used. Whereas, other studies have operationalized stayers in the upper quartile of those who have lived at their current address as a proportion of their adult life (Gilleard, Hyde, & Higgs, 2007), this approach could not be adopted in this study, as a categorical (not continuous) variable captured length of residence.

The (currently) cross-sectional nature of CFAS Wales data means that we cannot be sure that networks adapt in the face of poor health (e.g., from LI to FD or from WCF to PR) as research demonstrated in the 1990s (Wenger & Scott, 1995). However, CFAS Wales is a longitudinal study, and future waves of data will provide an opportunity to test these assumed changes in network types alongside personal characteristics (stayer versus non-stayer; increasing disability) and area characteristics (deprivation and population turnover).

4.2 | Implications

Rural areas are associated with different levels of deprivation (Doheny & Milbourne, 2014). Levels of deprivation, in turn, are likely to influence

the perceived desirability of an area, and thus population stability or turnover. Desirable rural areas may have higher population turnover, which can lead to gentrification: increased property prices that drive out younger indigenous people unable to afford local housing (Stockdale, 2010). Conversely, those living in less desirable, deprived areas may be unable to afford to move away (Haase, 2009), resulting in a lower population outflow and potentially a greater proportion of rural stayers than in more affluent or less deprived areas.

Between 2014 and 2020, Wales qualified for almost £2 billion of EU structural funding. A majority of this funding was invested in West Wales and the valleys to improve skills and make these regions more competitive. However, Brexit could have a significant impact on the long-term level of assistance that is available to deprived communities (Jones, 2016). Without substantive changes made to deprived rural areas in Wales, population turnover and the distribution of support networks for older people are unlikely to change rapidly. However, a lower rural population turnover has a benefit: older people are more likely to be embedded in the most robust networks (LI networks) or draw on proximal family (FD networks) to provide support in the face of ill health. Moreover, while support networks are often considered in terms of the availability of support for older people, older stayers with LI networks may also be a source of support for younger generations. Reductions in the social safety net in the United Kingdom has meant that young people rely more on families for support, such as grandparental childcare, financial contributions, or housing (Keating et al., 2015).

This research has implications for planning of formal services in different rural places. Ageing in place is more likely in stable populations. Those ageing in place in rural areas may be socially engaged in LI networks or more socially marginalised in FD networks. Older people with FD networks may be isolated from their peers and despite having family members close at hand, can feel lonely (Wenger, 1989). Additionally, it is important to identify and address the support and information needs of informal carers in FD networks, for example, through support groups, respite services, and educational training (Dawson, Bowes, Kelly, Velzke, & Ward, 2015). These service interventions can reduce stress, improve relationships, and delay institutionalisation (Brodaty, Green, & Koschera, 2003; Rosa et al., 2010).

Less stable rural populations with an inflow of preretirement migrants and outflow of younger populations (15–24 years) may be considered as ageing places characterised by socially engaged WCF networks and socially marginalised PR networks. Older people with PR networks are more likely to deny problems or refuse help from formal services. However, an absence of local informal caregivers (other than a spouse in some instances) means that ultimately they will rely more heavily on formal support services (Wenger, 1994). Thus, policies that encourage within and between country geographic mobility as a solution to labour market imbalances (The Committee Office House of Lords, 2002), coupled with trends in retirement mobility (Stockdale & MacLeod, 2013), potentially have long-term implications for formal health and social care service provision in rural areas. More research is required focusing specifically on these trends as there appears to be a social cost for older non-stayers in rural areas who are less likely than stayers to be in a position to receive help from informal carers in later life.

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