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Perceived neighbourhood context, disability onset and old age

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ABSTRACT

National household and individual level data are used to explore perceived neighbourhood characteristics (PNC) and neighbourhood social participation (NSP) associations with later life disability onset (DO). The sample includes 3011 older people, with 8128 observations between 1995 and 2001. Three logistic regression models are developed. Model 1 – PNC is associated with DO (OR = 1.065). Model 2 – NSP is associated with DO (OR = 0.613). Model 3 – NSP does not buffer against PNCs in old age DO (OR = 1.063). With growing emphasis on community care, harmful and protective neighbourhood roles must be considered when developing policy and health initiatives for old age disability.

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1. Introduction

The focus of this paper is on the relationship between perceived neighbourhood context (in terms of neighbourhood characteristics and neighbourhood social participation) and the onset of disability among older Irish adults. Research on dwelling and care preferences has demonstrated that the vast majority of people would like to grow old and be cared for in their own neighbourhoods and communities (Williams et al., 2005). The suprapersonal (characteristics of people), social (norms and values) and physical environments embodied in a neighbourhood, are fundamental to the experiences of ageing (Lawton, 1975, 1982). For older people, these communities can have a maintaining function, with respect to place-related feelings, attachment and memories, a stimulating function, in terms of shaping quality of life, and a supportive function in regard to facilitating activities of daily living (Wahl, 2001). This is evidenced not only by the connection that Irish older people have with their neighbourhoods, but also by the fact that majority of care in Ireland is provided in the community on an informal and voluntary basis (Walsh and O'Shea, 2008a,b; Timonen and Doyle, 2008). Conversely though, neighbourhoods, through their physical characteristics and social structures, may also serve to compromise the maintenance, stimulation and support of older people. It is these dual capaci-

ties of neighbourhoods that must be considered for disability onset among older people.

There is a substantial literature to suggest an association between people's health and the socio-physical elements and characteristics of their surrounding environment and neighbourhoods (Parks and Kearns, 2006; Wright and Kloos, 2007; Ziersch et al., 2005; Riva et al., 2007; Coen and Ross, 2006; Yen et al., 2007; Cohen et al., 2008; Gary et al., 2007; Pickett and Pearl, 2001; Diez Roux, 2002). Indeed, the multi-factorial determinants of disability have been found to be further complicated by the realities of where people live. Functional loss has been connected with a series of neighbourhood characteristics, including socio-economic status, excessive noise, traffic, and substandard housing (Freedman et al., 2007; Balfour and Kaplan, 2002; Clarke and George, 2005; Yen et al., 2006). Nevertheless, few international studies concentrate specifically on older adults (Stuck et al., 1999) and even fewer on late life disability onset. This topic has not been investigated for Ireland and has received little attention in the European context.

Disability among older adults has also been linked with social relations and social participation. Avlund et al. (2004a) found that being embedded in a strong network of social relationships provides protection against old age disability. Similar connections have been documented by other researchers, both for disability and general physical functionality (Unger et al., 1997, 1999; Mendes de Leon et al., 1999, 2001; Everard et al., 2000). Again, however, few studies explore the effects of social relations and social resources in an individual's neighbourhood on disability onset in later life. The international literature on social capital provides some empirical basis for hypothesising a relationship between a person's social

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participation in their neighbourhood and their physical and mental well-being (e.g. Kawachi et al., 1999). That said, while social capital has a neighbourhood component, research at the neighbourhood specific level for the individual is again rare (Bowling et al., 2006; Kim, 2008). Instead, it is typically the aggregate of social networks available to a person (Bourdieu, 1980; Putnam, 1995; Portes, 1998; Browning and Cagney, 2002) that is researched, rather than those resources directly proximal to their home. Given that the ability for social interactions can be reduced with increased age (Mollenkopf et al., 1997), the social opportunities provided by older adults' surrounding communities (e.g. club organisations and potential for neighbourhood networks) are likely to be crucial.

Research also indicates that the social environment of neighbourhoods can serve to compensate for neighbourhood characteristics (e.g. crime and socio-economic deprivation) traditionally associated with negative health outcomes. Researchers who found low mortality rates in deprived neighbourhoods, suggest that cohesive social structures (e.g. large social and support networks) may protect against deleterious effects of such environments (Eschbach et al., 2004). Similarly, Cattell (2001) noted that deprivation can catalyse social action and participation; helping to buffer against the harsher effects of neighbourhood characteristics. In terms of disability onset, however, the relationship between social participation within neighbourhoods (referred to in this paper as neighbourhood social participation), and perceived neighbourhood characteristics has not been explored.

Therefore, even though the studies of neighbourhood characteristics and social participation are insightful, they are not sufficient in number, nor in focus, to provide a comprehensive analysis of the harmful and protective roles of neighbourhoods in the disablement process. The current approaches and philosophies of health and social care for older people mean that these associations, and their direction, are becoming increasingly importance. Communities, and the resources and opportunities that they can provide, are key components in the care of older adults. This is not just in terms of a traditional reliance on voluntary support, as in Ireland and some of its European counterparts (Phillips et al., 2000), but it also reflects neo-liberal strategies that have help shift responsibility from the state back to people's families and their communities. Additionally, while statutory care of older people in Ireland is still rooted in an institutional model of provision, there has been an increased investment in community care infrastructure, following the trend in other western developed nations (Rostgarrrd, 2002). Thus, neighbourhoods are increasingly important sites of informal and formal care provision. Without understanding the full influence of the socio-physical elements of a neighbourhood, effective care provision for older citizens could be compromised.

In order to address the existing knowledge deficits, this paper uses data from the Living in Ireland Survey to explore the relationship between perceived neighbourhood characteristics (PNCs) and neighbourhood social participation (NSP), and the onset of disability among older Irish adults. Disability, in this paper, refers to the social model of disability adopted by the World Health Organisation in the International Classification of Functioning, Disability and Health in 2001 (World Health Organisation, 1999). The model recognises that barriers in society, and a person's interactions with their surrounding environment, play a role in the disablement process and can therefore influence the onset of disability. On the basis of this definition, the underlying hypothesis of this research is that problems in a person's neighbourhood (e.g. environment problems and neighbourhood social problems) and reduced levels of neighbourhood social participation can contribute to an onset of disability. As the data do not allow for causal paths to be determined, the core question is whether or not perceived neighbourhood context (including PNCs and NSP) is associated with disability onset among older adults.

2. Data, measures and analysis

The data for the analysis were drawn from the Living in Ireland Survey 1995–2001, which is the Irish component of the European Community Household Project. The sample is representative of private households in Ireland and administered as a face-to-face interview. This longitudinal survey provides information on the social situation, financial circumstances and living standards of households. Each individual is followed up annually.

In the context of this study, the onset of disability was defined as a person not having a disability for one year, prior to having a disability for at least one year. Similar definitions, reflecting the social model of disability and the WHO classification outlined above, have been used by other studies in the literature (Burchardt, 2002). The disability onset variable is constructed on the basis of individuals responding to the following question:

“Do you have any chronic physical or mental health problem, illness or disability?”

While this question also includes a reference to chronic health and illness, the item has been shown to be a reliable indicator of disability and has been used to investigate disability onset in previous studies (Gannon and Nolan, 2007). Furthermore, the question reflects the social model of disability, which aims to extend the understanding of disability beyond the traditional clinical physical impairment. While information on the severity of disability was also asked, the sample sizes available at each level of severity are not conducive to a detailed analysis for this study. This limits our opportunity to look at different levels of disability transition across the panel information.

Ireland does not have a system of post codes or other neighbourhood indicators in place. As a result it is not possible to merge individual level information and neighbourhood level data. We thus have to rely on self reported data and cannot control for variables such as neighbourhood age structure or neighbourhood socio-economic status.

PNC variables are taken from the household component of the Living in Ireland Survey and consist of a composite indicator and a single question. The composite indicator focuses on perceived neighbourhood problems spanning environmental and social dimensions. This indicator includes items on traffic, pollution, litter, noise from neighbours, vandalism and anti-social behaviour. The composite indicators were constructed by summing the responses to the individual survey items. The single question focused on perceived levels of crime within the respondents' neighbourhood, relative to that in other areas.

NSP variables consist of two survey items summed to provide a composite indicator. The first question asked for information on whether the survey respondent was a member of a club or group within the local community. The second question enquired how often the respondent spoke to their neighbours. These indicators are in line with aspects of social network theory (i.e. the relationship of social networks to resources available to the individual) and represent conceptualisations of social contact and social activity similar to that used in previous research (Berkman and Glass, 2000; Bowling and Stafford, 2007). A full description of each of the variables, their composites and response categories are presented in Table 1.

A logistic regression model is used to explore factors relating to onset of disability (base category is no onset). Since the dependent variable is a (1,0) variable we choose this type of limited dependent variable model, over a more basic linear regression model. The choice of regression specification is related to the literature that has previously explored the topic of health and neighbourhood effects. For example, Balfour and Kaplan (2002) estimate a logistic model to provide odds ratios in the explanation of

Table 1
Variable descriptions.

Variables	Survey question and response
<i>Perceived neighbourhood characteristics</i>	
Perceived neighbourhood problems	How common would say that each of the things listed on this card is in your neighbourhood? (1 = 'Very common, or Fairly common'; 0 = Otherwise) Pollution or dirt from industry or traffic Other street noise – traffic, business, factories, etc. Noise from neighbours Teenagers hanging around on the street Rubbish and litter lying about Homes and gardens in bad condition Vandalism and deliberate damage to property People being drunk in Public
Perceived neighbourhood crime	Compared with the rest of Ireland how much crime would you say is in your area? (1 = 'A lot more' or 'A bit more'; 0 = Otherwise)
<i>Neighbourhood social participation</i>	Are you a member of any club or organisation such as a sports or entertainment club, and a neighbourhood group? (1 = 'Yes'; 0 = 'No') How often do you talk to any of your neighbours? (1 = 'On most days' or 'Once or twice a week'; 0 = otherwise)

neighbourhood problems and health. More recently, Freedman et al. (2008) looked at the increased risk of disablement due to neighbourhood characteristics, and present results as odds ratios. The results allow inference on the direction and magnitude of effect. Alternatively, we could present the coefficients but prefer in this study to follow previous research referred to above and present odds ratios. Explanatory variables include PNC and NSP indicators. Given documented associations between individual and household level variables and disability onset (Grundy and Glaser, 2000; Melzer and Parahyba, 2004; Matthews et al., 2005; Dunlop et al., 1997), gender, age, number of adults in the household, self-rated health at baseline, household equivalised income and house ownership are controlled for in the analyses.

Estimation of models on disability requires the knowledge of true disability status of an individual. Generally, such data is not available and instead we use a proxy for disability – reported disability status. We therefore estimate a latent variable model and probabilities are calculated as:

$$D_{it}^* = X_{it}\beta + u_{it} \quad (1)$$

where D_{it}^* is the underlying latent variable that indexes the measure of disability, u_{it} is the random error term with a logistic distribution, X_{it} is a column vector of explanatory variables, and β is a column vector of parameters to be estimated. The dependent variable is $d_{it} = 1$ if $D_{it}^* > 0$ or $d_{it} = 0$ if $D_{it}^* < 0$. This model is estimated as a maximum likelihood logit model and predicted probabilities of disability are calculated as:

$$P(d_{it}|X_{it}) = \frac{e^{X_{it}\beta}}{1 + e^{X_{it}\beta}} \quad (2)$$

We present the results as log odds, expressed as a linear function of the explanatory variables:

$$\ln \left(\frac{p(d_{it}|X_{it})}{1 - p(d_{it}|X_{it})} \right) = X_{it}\beta \quad (3)$$

The effect of a unit change in X on the log odds of the event occurring is thus given by the (coefficient. To facilitate the use of pooled data, we estimate a pooled logistic model and adjust the standard errors for clustering at the individual level.

Table 2
Reported disability onset by gender, age and household composition.

Demographic variables	Disability onset (%)
<i>Gender</i>	
Male	17.2
Female	17.8
<i>Age</i>	
55–64 years	13.7
65–74 years	19.1
75 years plus	25.0
<i>Household composition</i>	
1 adult household	21.3
2 adult household	17.5
3 plus adult household	17.0

The data are not used to estimate causal impacts, as the sample sizes do not permit this. The data represent person observations and the standard errors are thus adjusted for clustering at the individual level over the years. The final sample includes 3011 older adults aged 55 years and over, encompassing 8128 observations across the seven year period.

3. Results

Seventeen and a half per cent of individuals experience an onset of a disability over the seven year period, with 36% of survey respondents reporting being free of disability for the same period and 11% experiencing persistent disability. Table 2 displays a breakdown of disability onset by gender, age band and household composition. A comparable number of male and female respondents (17.2% and 17.8%, respectively) had a disability onset during the period. Disability onset increases with age and with a lower number of adults living in participating households.

Table 3 presents cross-tabulation statistics for disability onset and PNCs and disability onset and NSP. Those individuals who experienced more difficulties with their neighbourhoods, with respect to perceived accommodation problems, perceived neighbourhood problems and perceived neighbourhood crime, report a higher percentage of disability onset. Conversely, those individuals who have higher levels of social participation within their neighbourhoods, namely talking to neighbours and being a member of a local club, reported lower rates of disability onset.

The results of the logistic regression model are displayed in Table 4. Model 1 shows that while perceived neighbourhood crime is not significant (OR = 1.0729) perceived neighbourhood problems (OR = 1.0695) are statistically associated with onset of disability. In terms of economic significance both perceived crime and problems would be associated with an increased risk in disability onset.

Model 2 shows that NSP is associated with disability onset (OR = 0.6133). This means social participation is associated with a

Table 3
Cross-tabulation statistics for disability onset by perceived neighbourhood context.

Neighbourhood context variables	Disability onset (%)	
<i>Perceived neighbourhood characteristics</i>	Less than 3 problems	More than 3 problems
Perceived neighbourhood problems	17.2	22.6
Perceived neighbourhood crime	Reported 'Yes'	Reported 'No'
	21.5	17.3
<i>Neighbourhood social participation</i>	Reported 'Yes'	Reported 'No'
Club membership	15.0	19.3
Talk to neighbours	17.0	26.9

N observations = 8128 N People = 3011.

Table 4
Logistic regression of disability onset.

Variables	Odds ratio		
	Model (1)	Model (2)	Model (3)
<i>Perceived neighbourhood characteristics</i>			
Perceived neighbourhood problems	1.0695** (0.0306)	n/a	1.0667** (0.0306)
Perceived neighbourhood crime	1.0729 (0.1568)	n/a	1.0837 (0.1582)
<i>Neighbourhood social participation</i>			
Club membership or talk to neighbours	n/a	0.6133** (0.090)	0.6165** (0.0909)
<i>Gender</i>	1.0411 (0.0716)	1.0331 (0.0711)	1.0323 (0.0711)
<i>Age 55–65</i>	0.5904** (0.0568)	0.6092** (0.0585)	0.5966** (0.0575)
<i>Age 65–75</i>	0.8431* (0.0776)	0.8678 (0.0800)	0.8576* (0.0792)
<i>One adult household</i>	0.8903 (0.0935)	0.9078 (0.0951)	0.9012 (0.0946)
<i>Two adult household</i>	0.9003 (0.0691)	0.0904 (0.0696)	0.9018 (0.0694)
<i>Household equivalised income</i>	0.9924** (0.0004)	0.9992** (0.0004)	0.9992** (0.0004)
<i>Own house</i>	0.7149** (0.0584)	0.6886** (0.0550)	0.7198** (0.0588)
<i>Baseline health</i>	0.3057** (0.0230)	0.3091** (0.0232)	0.3102** (0.0234)
<i>R²</i>	0.0659	0.0663	0.0674
Observations = 8128 N People = 3011			

Note: ** $p \leq 0.05$, * $p \leq 0.01$ Standard errors, in brackets, are adjusted for clustering at individual level over the years. Regression controls for age, gender, household composition, baseline health, equivalised income and house ownership.

lower risk of disability onset. To examine the impact of NSP on the association between PNCs and disability onset, the combined club membership and talk to neighbours variable was introduced into the analysis. Model 3 shows that perceived neighbourhood problems are still associated (OR = 1.0667) with disability onset, after controlling for NSP. Although, the risk of disability onset is lower for those who engage in social participation.

It is also interesting to note the significance and substantive impact of other variables. Results show that males are slightly more likely to have a disability onset, even if it is not significant, once we control for other characteristics. In terms of age, older people are more likely to have an onset of disability. Size of household for an individual matters and those in smaller households have a lower risk of disability onset. Both having a higher income and owning a house are associated with lower levels of onset. This follows the hypothesis that those in poverty are more likely to have an onset of disability. Interestingly those who have good health are less likely to have an onset, confirming the hypothesis that disability can be a persistent phenomena and those with initial bad health are more likely to have future bad health and hence an occurrence of chronic conditions or disability.

4. Discussion

This research provides valuable insight into the late life disablement process and the harmful and protective roles of neighbourhoods across the dimensions of PNCs and NSP. Perceived neighbourhood context variables are derived from survey respondents' subjective assessments of their neighbourhoods. While acknowledging that the personality and the personal circumstances of an individual may influence their perceptions of their neighbourhood, ascertaining the magnitude of that influence is outside the focus of this paper and is not possible with the available data. That said, perceived neighbourhood context has featured in a number of previous studies in this area and has been found to be a reliable indicator of neighbourhood context (Yen et al., 2006, 2007; Piro et al., 2006).

4.1. Perceived neighbourhood characteristics and disability onset

The study demonstrates a significant association between onset of disability and aspects of perceived neighbourhood characteristics. This association is in line with the findings of previous disability research on neighbourhood context and physical functioning (Parks and Kearns, 2006; Freedman et al., 2007, 2008). Research has shown

that excessive noise, inadequate lighting and heavy traffic are associated with the largest increase in risk of functional disability (Balfour and Kaplan, 2002). Similarly, Yen et al. (2006) highlighted that people reporting serious neighbourhood problems (including those of noise, trash, and traffic) have been found to exhibit significantly poorer physical functioning. These variables are comparable to the composite items used in this study.

The pathways through which perceived neighbourhood problems operate in the disablement process are likely to be varied. While certain variables such as waste and litter, noise and pollution may contribute directly to the pathology of disability, the modifying pathways of the more behavioural constructs are less clear. That said, neighbourhood problems similar to those used in this study (e.g. people drunk in public and deliberate damage) have been linked to self-rated health and long term disability. For example, these issues have been found to impact on feelings of self-mastery within an environment and serve as sources of chronic stress (Pampalon et al., 2007; Steptoe and Feldman, 2001). Others have suggested that such problems may discourage or detract from self-care activities and everyday functioning (Eschbach et al., 2004). While these studies demonstrate possible mechanisms of impact on disability onset, it is likely that such associations are dependent on the particular socio-physical dynamics within a neighbourhood and the nature of the disability, which together determine the influence of such neighbourhood factors. Nevertheless, the limitations in the available data restrict the existence of these pathways to theoretical discussion in this study.

Perceived levels of neighbourhood crime were not found to be significant in the analyses. Fear of violence and neighbourhood level violence has been found to impact on physical activity (Piro et al., 2006). However, associations between crime and the disablement process are at best tentative within the literature (Freedman et al., 2007; Balfour and Kaplan, 2002). For this reason the findings of this study are in line with existing research in the area.

4.2. Neighbourhood social participation and disability onset

The positive associations between social participation and health outcomes have been documented extensively in the health promotion and psychological literatures (Barnes et al., 2004; Reed and Payton Roskell, 1996; Desrosiers et al., 2000). While evidence for the relationship between social participation and onset of disability is more limited, our findings follow the patterns established by other researchers (Avlund et al., 2004a,b). However, the distinctive contribution of this paper is its focus on social participation

within older adult neighbourhoods, and the protective association between such participation and the disablement process. Although this finding may seem a straightforward deduction from the more general associations, specific evidence is not documented within the literature.

Exactly what mechanisms of NSP serve to combat negative health outcomes, such as disability, is unclear (Mendes de Leon, 2005). Indeed, social (e.g. support networks) psychological (e.g. self-efficacy) and physiological (e.g. neuroendocrine regulation) mediators have been theorised to operate within the context of particular studies (Lee and Shehan, 1989; Walsh and O'Shea, 2008a,b; Rodriguez et al., 2008). It was also found that measures related to social cohesion were linked to long-term disability (Parks and Kearns, 2006). In effect, while the form of participation is likely to be a factor in what mechanisms are at work, the benefits, and the various channels through which they are obtained, are liable to operate across multiple-dimensions, and to be dependent on an individual's life course and current perspectives.

With the advent of a stronger research, policy and practice emphasis on the role of neighbourhoods in older adult well-being, it is worth considering the pathways between social participation and social care. Informal networks for older people have been categorised into social networks, support networks and care networks. Although each possesses a distinct set of characteristics, these networks represent points along an evolutionary spectrum, where social relationships develop into supportive resources, which in turn evolve into caring roles. The effectiveness of this evolution is a function of the proximity of members, bonding ties, size of original social network, normative expectations, member mortality rates and the older person's dependency needs (Keating et al., 2003). Thus, while club membership and contact with neighbours are not likely to be the sole source of emotional and physical support, they may offer a significant resource for the formation of support and care networks in old age. This is supported by Nocon and Pearson (2000) who found that friends and neighbours are important facilitators of community driven older adult social care in the community. The findings are also in line with aspects of social network theory and concepts of neighbourhood social capital (Berkman and Glass, 2000; Kim, 2008).

There is an obvious and valid question around the opportunity cost of investing in community participation programmes to combat disability onset among older people. While the costing of relationship related welfare gains have been approximated in similar contexts (Powdthavee, 2008), such an analysis is outside the scope of this study. Certainly, it is necessary to acknowledge that interventions, such as those based on health promotion and health screening, will have a more quantifiable impact on later life disability onset. However, and as illustrated in part by the findings of our analysis, the social structures within a community are multifaceted in how they shape the well-being of residents and have the potential to influence health outcomes. The difficulty is with respect to measurement. Further research is required to understand the exact mechanisms of how community structures impact on health and well-being and what the economic costs of investing in such structures are for the wider society.

4.3. Perceived neighbourhood characteristics and neighbourhood social participation

The findings of the regression models indicate that while NSP may fulfil a protective role in the disablement process, it does not alleviate the negative impact of PNCs. In terms of disability onset among older adults, this relationship has not been previously documented. This finding would appear to contradict some previous studies on general health outcomes (Eschbach et al., 2004; Cattell, 2001). However, a note of caution is necessary here. Although club

membership and contact with neighbours are valid indicators of an individual's social participation within a neighbourhood, they are not indicative of the socio-cultural aspects of neighbourhood communities spoken about in Eschbach et al. (2004) and Cattell (2001). The absence of a communal element, such as that representing social cohesion, collective action or community responsibility, is likely to have contributed to NSP's inability to buffer against the deleterious effects of troubled neighbourhoods in this study. Thus, the finding is solely related to individual social participation within a neighbourhood, and should not be viewed as referring to neighbourhood wide interaction.

Nonetheless, our results show that neighbourhood problems may still persist and further evaluation must be done, to see how improvements in the community at large can benefit older people and alleviate costs of disability more generally.

5. Conclusion

Restrictions in the data set mean that there are some limitations in the research, including indeterminable causal pathways, subjective neighbourhood context indicators and insufficient information to assess quality of neighbourhood relationships. There is also a degree of circularity with respect to neighbourhood social participation and disability onset, where the nature of disability itself will impact on the capacity of people to participate socially. However, even with these limitations acknowledged as caveats to the analyses, this paper makes significant contributions to the limited international knowledge in the area. Firstly, evidence was presented for associations between PNCs and disability onset among older adults in a European setting. Secondly, NSP was found to play a protective role in the onset of disability in later life. Thirdly, in the context of this study, NSP did not alleviate the negative effects of PNCs with respect to disability onset among older people. The findings of the research suggest that policy makers and health care professionals need to consider the harmful and protective roles of neighbourhoods, as a part of a more holistic approach to development of policy and health initiatives for old age disability.

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