Landscape and Urban Planning 139 (2015) 117–125

Contents lists available at ScienceDirect

Landscape and Urban Planning

journal homepage: www.elsevier.com/locate/landurbplan

Research Paper

The effectiveness of 'shared space' residential street interventions on self-reported activity levels and quality of life for older people

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HIGHLIGHTS

- A longitudinal study of 'home zone' changes to the street environment.
- Focus on quality of life and physical activity levels in an elderly population.
- We find positive changes in perceptions of the environment but results are more ambiguous for wider outcomes.

ARTICLE INFO

Article history:
Received 11 July 2014
Received in revised form
19 November 2014
Accepted 26 February 2015

Keywords:
Shared space
Older people
Quality of life
Physical activity

ABSTRACT

The role of the built environment in facilitating physical activity is well recognised. However, longitudinal studies into the effects of changes to the built environment on levels of activity and quality of life outcomes are lacking, especially for older people. This paper presents results from a longitudinal study of 'home zone' style changes to residential streets, designed to make streets more 'liveable' by reducing the dominance of vehicular traffic and creating shared space. The interventions were focused in deprived areas, where the changes followed an inclusive, community-led approach. The intervention sites were matched with comparison sites receiving no intervention. Whilst existing studies into the outcomes of home zone type interventions have tended to focus on tangible measures such as road casualties or traffic speeds, this study examines broader, self-reported behavioural (i.e. activity levels and perceptions), health and quality of life outcomes. Results were gathered pre-intervention in 2008 and then, post-intervention, in 2010 or 2011 for participants aged 65 or older. They show that interventions are associated with a significant improvement in perceptions of how easy it is to walk on the street near home. Participants also considered that they were significantly more active post-intervention. However, there was less evidence of positive change in health, quality of life, frequency of activities outdoors, time spent outdoors, or better social connectedness. One potential reason is that a greater time period post-implementation is needed for such outcomes to become manifest.

1. Introduction

Maintaining outdoor activity is an important component of quality of life in an ageing population (Schwanen & Ziegler, 2011). Maintaining mobility may contribute to wellbeing in later life through physical activity and enabling access to different environments, which in turn may help physical health, mental health and wellbeing through a reduced risk of cognitive decline (Yaffe, Barnes, Nevitt, Lui, & Covinsky, 2001) and maintained social contact.

The strong link between mobility and wellbeing presents a challenge in ageing societies (Nordbakke & Schwanen, 2014) for whom maintaining mobility may be compromised as ageing progresses. The built environment can be an important factor in facilitating mobility (Saelens & Handy, 2008), yet it has the potential to disproportionately affect older people either positively or negatively, given that environmental influence is likely to be greater for those with reduced mobility (Lawton & Nahemow, 1973). Saelens and Handy (2008) identify a need both for more detailed studies of older people's walking and for longitudinal studies focussing on the relationship between the built environment and walking. Wahl, Iwarsson, and Oswald (2012) express a need for longitudinal studies to explicitly study ageing in the context of the environment.

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http://dx.doi.org/10.1016/j.landurbplan.2015.02.019
0169-2046/

We define environment as the objective and perceived characteristics of the physical context in which people spend their time (Van Cauwenberg et al., 2011) and in this paper we are referring to the *outdoors* or the built environment and, in particular, the local streets and open spaces surrounding a person's home. Exclusion from parts of the built environment because of poor or insensitive design can be seen as an environmental justice issue (Day, 2010). In an ageing population, an unsupportive environment may reduce the ability to get outside and lead to a spiral of decline. Conversely, good design of streets and pedestrian environments can contribute to support for healthy activity into old age and thus enhance the health and wellbeing of elderly people through inclusive design. Yet there is a lack of longitudinal studies in this field (Ogilvie et al., 2010; Saelens & Handy, 2008; Wahl et al., 2012). There is limited empirical research relating to the effects of transport or street design interventions on the mobility and wellbeing of older people and little understanding of which aspects of the built environment, real or perceived, lead to increased levels of activity in that environment (Morrison, Thomson, & Petticrew, 2004; Ogilvie et al., 2010; Ward Thompson, 2013). This paper describes results from an attempt to address some of these issues via a longitudinal study of older people's perceptions and experience of changes in their local street design.

2. Background

'Home zone' style street design interventions in the UK have been developed based on the Dutch *woonerf* (living yard) (DfT, 2005; Hamilton-Baillie, 2008), which have attracted worldwide interest in recent decades (Ben-Joseph, 1995; Hamilton-Baillie, 2008). 'Home zones' consist of low-speed residential streets are designed based on a concept of 'shared space', balancing the needs of pedestrians and vehicular traffic (DfT, 2007). A home zone is defined as:

> "a residential area where the design of the spaces between homes provides shared space for all users, including motor vehicles and other road users, with the wider needs of residents, including pedestrians, children and cyclists, being fully accommodated" (Biddulph, 2003).

This is achieved through aspects of street design such as: unconventional road surface; use of raised platforms; gateway features to signal the entrance to a home zone; build-outs to slow down traffic; planters; benches; and lighting. Sustrans is a sustainable transport charity in the UK which has taken a community based approach to implementing changes to street design based on home zone principles, which they have termed 'DIY Streets'. These are designed to be affordable alternatives to traditional home zones and retrofitted to existing streets (Sustrans, 2013). We use Sustrans' DIY Streets approach as an example of a street design intervention to study the effect of a change in the environment on the perceptions, behaviour and quality of life of older people. One of the key features of home zones is the involvement of, and consultation with, local residents in the process of redesigning the streets (Biddulph, 2003; DfT, 2007) and this approach was fundamental to Sustrans' DIY Streets pilot projects.

Although their inclusive nature is open to critique (Imrie, 2012) due to concerns for particular groups in society, such as blind and partially sighted people, such environments are intended to be inclusive environments which improve the quality of the streetscape and lead to environmental, economic, health and quality of life benefits for all (Biddulph, 2003; Hamilton-Baillie, 2008). According to Biddulph (2003), home zones should be of particular benefit to those who may be less mobile, such as children, older and disabled adults, and encourage walking and cycling in the local area. It is thus no surprise that there have been studies focused on the effects of home zones on children's play activities (Gill, 2006; Van Andel, 1985) and on pedestrian activity (Morrison et al., 2004; Webster, Tilly, Wheeler, Nicholls, & Buttress, 2006) but we have not found any studies focussing particularly on the effects for an elderly population.

Webster et al. (2006) evaluated nine pilot home zone schemes in England and used post hoc interviews with adults aged 17 plus (mean age = 47) as well as accident and traffic flow data. They found that walking was considered to be more pleasant, notably amongst residents who were in favour of the schemes, traffic levels were reduced and there was a slight increase in time spent outside the home. In drawing together evidence from a number of pilot home zone schemes in England, Biddulph (2008) presents objective measures of changes in accidents and traffic speeds as well as residents' views post-scheme implementation, using survey data which collected their perceptions and observations of the home zones. Results were mixed; whilst overall support was generally high, this varied by scheme. In most cases, over 50% of respondents felt the scheme had improved safety and that it was safer for children to play in the streets, but that sociability, vandalism and antisocial behaviour had become worse. It must be noted that the evaluation by Biddulph (2008) and Webster et al. (2006) are based on residents' retrospective evaluations of the schemes rather than using repeated measures to understand whether the interventions had effected change. As Biddulph points out, these perceptions could be affected by the expectations residents had of the schemes. Given that many of the homes zones do not end up being implemented in full, it is possible that, even if residents perceive safety to have improved relative to the baseline situation, if their expectations were greater, then retrospective evaluations may be negative.

Drawing together several evaluations of UK home zones, Gill (2006) suggests they are viewed favourably by both adults and children and that increases in children playing outside as a result have been observed. However, none of these studies used repeated measures to examine outcomes before and after implementation of a shared space intervention which makes it difficult to be confident about the influence of changes at the individual level. Ståhl, Horstmann, and Iwarsson (2013) evaluated similar environmental interventions in Sweden, but which were designed specifically to enhance the mobility and wellbeing of an elderly population; in this sense the interventions were more targeted than DIY Streets. They found that amongst the older population, women and those with better health had greater appreciation of the improvements.

In summary, whilst the wider health and wellbeing benefits of transport interventions, such as shared space or home zone schemes are often discussed, empirical evidence is limited and what does exist is often retrospective. Existing evaluations of home zone interventions have focussed on objective outcomes such as road casualties or traffic speeds and qualitative assessments of residents' post hoc satisfaction, rather than on outcomes-based improvement, for example in health and wellbeing, which also can be said of transport interventions more broadly (Morrison et al., 2004). Measuring tangible outcomes such as traffic speeds and resident satisfaction, whilst valuable, does not inform as to whether the changes have improved the quality of life for residents or encouraged any change in travel behaviour, which they are designed to achieve. Whilst Ståhl et al. (2013) undertook a pre–post-study, they did not have a comparator site against which to measure change over time attributable to the intervention, and Morrison et al. (2004) focussed on a traffic calming scheme rather than a wider environmental intervention. Without a comparison site it is difficult to establish whether any change can be attributed to the intervention or whether the change would have occurred regardless. To date, we have not found a longitudinal study of the