Preventive Medicine 51 (2010) 157–163

Contents lists available at ScienceDirect

Preventive Medicine

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

Relative importance of physical and social aspects of perceived neighbourhood environment for self-reported health

Christopher Gidlow [a,*], Thomas Cochrane [a], Rachel C. Davey [b], Graham Smith [c], Jon Fairburn [c]

[a] Centre for Sport Health and Exercise Research, Faculty of Health, Staffordshire University, Stoke-on-Trent, England, ST4 2DF, UK
[b] Centre for Research and Action in Public Health, Faculty of Health, University of Canberra, ACT 2601, Australia
[c] Institute for Environment, Sustainability and Regeneration, Faculty of Sciences, Staffordshire University, Stoke-on-Trent, England, ST4 2DE, UK

ARTICLE INFO

Available online 24 May 2010

Keywords:
Health
Neighbourhood
Physical environment
Social environment

ABSTRACT

Objective. To explore the relative importance of the perceived physical and social neighbourhood environment for physical and mental health.

Methods. A representative random sample of adults was recruited from 10 areas across Stoke-on-Trent, UK (June–September 2007). Interview-administered surveys were used to record data on the perceived neighbourhood environment (physical and social), self-reported health, and socio-demographics. Multiple regression analysis was used to explore independent associations between environmental factors and physical and mental health.

Results. Independent physical and social environmental factors respectively explained 6.0% and 3.2% of variability in physical health and 2.8% and 4.4% of variability in mental health. Diversity of land use was the strongest and only *physical* environmental predictor of physical health (Beta = 0.27, $p<0.001$), explaining more variability than *social* environmental factors combined. Conversely, social support was the most important (and only) *social* environmental factor for mental health (Beta = −0.20, $p<0.001$); again, this explained more variability in mental health than the combined effect of four physical environmental predictors.

Conclusion. Perceived physical and social environmental characteristics were important for physical and mental health, independent of socio-demographic factors. Living in neighbourhoods with greater land use diversity appears particularly important for physical health, whereas social support appears more closely linked to mental health.

Introduction

The importance of 'place' for health is consistently demonstrated through geographical health inequalities (de Hollander and Staatsen, 2003; Ellaway et al., 2001; Pickett and Pearl, 2001). Socio-economic circumstance has often been used to characterise neighbourhood effects (O'Campo et al., 2009), but there is growing recognition of the need to consider the health implications of other environmental factors (Jones et al., 2007). The social ecology model, which has gained prominence in health promotion, asserts that health is influenced by various facets of both the physical and the social environment, in addition to various personal attributes (Stokols, 1992). This notion that physical, social, and emotional (or mental) well-being is the result of '*people's transactions with their physical and socio-cultural environments*' (Sallis et al., 1998, p. 380) provides the rationale for research that explores the links between health and various attributes of the neighbourhood environment.

As an environment with which people interact on a daily basis, the 'neighbourhood' is of growing public health interest as a potential means of *contextually sensitive* intervention (Cummins et al., 2007). Studies of the associations between environment and health often involve combining existing *area*-level environmental data with population health data (Cummins et al., 2005; Latkin et al., 2009; Riva et al., 2007), such as those exploring health effects of exposure to green space (Maas et al., 2006; Mitchell and Popham, 2007; Takano et al., 2002) or urban sprawl (Ewing et al., 2003).

Using *individual*-level data on perceptions, we can begin to understand the health implications of peoples' experiences of living in their neighbourhood. Consistent with the social ecology model, features of the neighbourhood environment can be broadly classified into *physical* (e.g., residential density, land use, green space) and *social* characteristics (e.g., crime, trust, reciprocity). There is some evidence linking individual residents' perceptions of their *physical* neighbourhood environment with health. Using data from Australian adults,

* Corresponding author. Centre for Sport, Health and Exercise Research, Faculty of Health, Staffordshire University, Brindley Building, Leek Road, Stoke-on-Trent, ST4 2DF, UK.
E-mail address: c.gidlow@staffs.ac.uk (C. Gidlow).

0091-7435/$ – see front matter © 2010 Elsevier Inc. All rights reserved.
doi:10.1016/j.ypmed.2010.05.006

Leslie and Cerin (2008) observed associations between numerous perceived *physical* environmental factors (e.g., aesthetics and greenery, land use mix diversity, street connectivity) and neighbourhood satisfaction, which were in turn linked to mental health. Data from a large Welsh cohort similarly found independent associations between perceived *physical* environmental characteristics and self-reported general health (Poortinga et al., 2007). Yet in both cases, the *social* environment also emerged as important. Although the physical environment can be increasingly considered as a potential support or deterrent for health behaviour (NICE, 2008; Jones et al., 2007), the *social* environment has often been the focus of investigations of perceived environment and health, especially mental health.

The *social* environment is multi-faceted, variously defined (e.g., social support, social capital, social cohesion), and consequently, much debated both in concept and measurement (Almedom, 2005; De Silva et al., 2005). Nevertheless, it is quite reasonable that a person will experience better health if they live in an area in which they are socially active, feel supported, safe, and trust their neighbours. Some researchers have demonstrated such links, but more commonly linking *social* environment with mental health (Baum et al., 2009; Veenstra et al., 2005). Indeed, most analyses of associations between perceived neighbourhood environment and self-reported health have tended to focus on mental health (Almedom, 2005; Kruger et al., 2007; Leslie and Cerin, 2008; O'Campo et al., 2009) or use a measure of general/global health (Poortinga et al., 2007; Sundquist and Yang, 2007; Wen et al., 2006).

Using data collected from a representative random sample of adults residing in Stoke-on-Trent, UK, we explored relationships between aspects of the perceived neighbourhood environment and health. In keeping with the social ecology model (Stokols, 1992), (i) neighbourhood environment was defined using a range of physical and social characteristics, in addition to socio-demographics to reflect relevant personal attributes, and (ii) their relative associations with health were explored for both physical and mental health outcomes.

Methods

Study area

This study was conducted in Stoke-on-Trent, UK, a medium sized conurbation with a population approaching 240,000. Many areas of the city are considered deprived. Approximately one-third of neighbourhood areas fall within the most deprived decile of national rankings (Communities and Local Government, 2007). Stoke-on-Trent has correspondingly high rates of morbidity and premature mortality (National Health Service, 2008) and poor outcomes for lifestyle (National Health Service, 2008; Sport England, 2007). Despite greater than average green space provision, Stoke-on-Trent is predominantly urban, characterised in many places by dense networks of terraced (or row) houses; it has a pervasive road network, and has low levels of active transport as highlighted by previous work (Cochrane et al., 2009).

Sample

Detailed accounts of sample recruitment and data collection protocols have been reported elsewhere (Cochrane et al., 2009; Davey et al., 2008). Briefly, Stoke-on-Trent comprises 160 Lower Level Super Output Areas (LSOA), with a mean population of approximately 1500 per area. Our adult sample was randomly selected from the 25 LSOAs which were not earmarked for regeneration, were not adjacent to one another or the city boundaries, and had low population churn rates (i.e., would be appropriate for intervention). Our sample size estimates indicated a requirement for 10 clusters. Thus, 10 LSOAs were chosen in 5 matched (by deprivation decile) non-adjacent pairs from the most deprived six deciles of deprivation (Cochrane et al., 2009). For each LSOA, 170 addresses were selected at random from the potential 1700 using the Postcode Address File for England, excluding non-residential addresses. For those comprised of several dwelling units (e.g., blocks of flats), one dwelling unit was selected randomly using a Kish grid. At each eligible address, one adult (aged 16 years or older) was selected as a respondent to the survey, again using a Kish grid.

Procedures

Data collection was undertaken between June and September 2007. Willing participants were asked to complete an interview-administered survey, which was carried out by the National Centre for Social Research (NatCen) using a computer-assisted personal interviewing (CAPI) approach. Interviews typically lasted 45 min, which included height and weight measurements. Full details of the interview procedures are available in the survey technical report (Speight et al., 2007). The study was approved by the Staffordshire University Research Ethics Committee.

Measures

Self-reported health

The Short Form 12 (Quality Metric, 2006) generic health questionnaire comprised 12 individual items on functional health and well-being. Scoring software was used to create two composite scores for physical and mental health: the physical component score (PCS) and the mental component score (MCS).

Socio-demographics

Individual socio-demographic variables collected included gender, age, ethnicity, occupational socio-economic classification (Office of National Statistics, 2000), employment status, education level, household tenure, and income. Question formats were those used in the decennial population census (England) (Office for National Statistics, 2001). Neighbourhood deprivation was ranked by decile from 1 (most deprived) to 10 (least deprived) according to individuals' resident LSOA using the Index of Multiple Deprivation 2004 (latest version not available at the time of study) (Communities and Local Government, 2004).

Perceived neighbourhood environment

(i) The Abbreviated Neighbourhood Environment Walkability Scale (ANEWS) (Cerin et al., 2006) was used with minor adaptations for use in a UK context. This comprised 40 items: 17 scored on a 5-point ordinal scale and 23 scored on a 4-point ordinal scale expressing degree of agreement with a given statement. Individual items were processed creating scores for various domains of the physical and social environment. Only those considered conceptually relevant to health were included in analysis (Leslie and Cerin, 2008): *physical environment*—residential density, land use mix, access to services, safety (traffic), street connectivity, physical barriers to walking, aesthetics, infrastructure for walking and cycling, and hilliness (excluded—lack of cul-de-sacs and lack of parking); *social environment*—safety (crime).

(ii) Social Capital and Social Exclusion Condensed module developed for the Health Survey for England (Bajekal and Purdon, 2001) was used to provide further measures of the social environment. This comprised 12 items for social capital (8 scored on a 4-point ordinal scale expressing degree of agreement with a given statement and 4 dichotomous items) and seven items for social support, all scored on a 3-point ordinal scale expressing the degree of agreement with a given statement.

Statistical analyses

The purpose of analysis was to explore the relative importance of individuals' perceptions of their physical and social neighbourhood environment for self-reported physical and mental health, independent of socio-demographics. Inspection of the two dependent variables derived from the SF12 (v2) health questions revealed significant negative skew for PCS and MCS. Therefore, both were inverse transformed; i.e., reflected ($1-$P/MCS$+$ sample max. for P/MCS) and square root transformed. Inverse transformed dependent variables were used in all analyses. Intra-class correlation coefficients calculated from individual and area-level variance for both dependent variables (ICC for PCS $=0.0152$; ICC for MCS $=0.0357$) demonstrated a lack of clustering of dependent variables in the 10 study areas (i.e., within-area variance was much greater than the between-area variance). This provided no justification for multi-level analysis. To explore further the