
Appendix 3: Annotated Bibliography

An Important Note

The 'HBEP Policy Implications for Practice' provided at the end of each reference are the interpretations of the authors. They relate to the policy implications that emerge from the research findings of the particular paper under which they appear. The policy implications are not necessarily applicable in all built environment contexts and need to be read in relation to the findings of that particular paper.





THIS MEMORIAL DRIVE
IS DEDICATED TO
THE MEMORY OF
THOSE MEN AND WOMEN WHO
LOST THEIR LIVES IN THE
DEFENSE OF THEIR COUNTRY
1914 - 1918 AND 1941 - 1945

Abraham, A., Sommerhalder, K. and Abel, T. (2010). 'Landscape and well-being: A scoping study on the health-promoting impact of outdoor environments'. *International Journal of Public Health* 55(1): 59-69.

Key Words: Landscape; wellbeing; health-promoting behaviour; resources; scoping study.

Location: The authors are from Switzerland; the study focus is worldwide.

Aim: To conceptualise and discuss how different characteristics of the natural and human-made landscape can be used as a health resource to promote physical, mental, and social wellbeing.

Method: This article is based on a scoping study which represents a special kind of qualitative literature review. Over 120 studies have been reviewed in a five-step-procedure, resulting in a heuristic device.

Conclusions: The results are divided into three subsections each focusing on mental, physical, and social wellbeing.

- *Mental wellbeing: landscape as a restorative.* Public open spaces used for public entertainment and sports have an intermediate restorative effect in contrast to natural settings (which have a high restorative potential) or urban settings (which have a low restorative potential).
- *Physical wellbeing: walkable landscape.* The way the urban landscape and environment is designed and built is crucial for the level of physical activity in daily life, work and leisure time.
- *Social wellbeing: landscape as a bonding structure.* Urban parks and other public places can enhance social integration if they facilitate social contacts, exchange, collective work, community building, empowerment, social networks and mutual trust.
- The relationship between landscape and health shows two main features: first, health-promoting landscapes contribute to healthy lifestyles in terms of physical activity and mental and emotional relaxation. Second, health-promoting landscapes promote the acquisition of resources for health such as social support, concentration and emotional stability.

Recommendations for Future Research:

- More research in this field is needed to better understand the health-promoting impacts of different landscape

characteristics. Future studies should address issues concerning variations in landscape needs in different social groups. To better understand the user needs, more participative designed studies and interventions are needed.

- To explore the issues around access to health-promoting landscapes by different social groups and not be limited to descriptions of the presence or absence of health-promoting landscape resources in socially deprived areas.
- To investigate the quality of health-promoting landscape resources, their social meaning and people's perception of their accessibility and relevance.

HBEP Policy Implications for Practice:

- Actively incorporate the provision of a variety of public open spaces into masterplans and strategic plans.
- Ensure public open space is not forfeited to other development agendas.
- Encourage the provision of walking and cycling trails.
- Reserve and manage spaces for organised community activities and casual social interactions.

Ashe, M., Feldstein, L. M., Graff, S., Kline, R., Pinkas, D. and Zellers, L. (2007). 'Local venues for change: Legal strategies for healthy environments'. *Journal of Law, Medicine and Ethics* 35(1): 138-147.

Key Words: Legal strategies; social norm; healthful behaviour.

Location: The authors are from the USA; the study focus is on the USA.

Aim: To assess and recommend legal strategies to help to de-normalise unhealthy behaviour and normalise healthy eating and physical activity.

Method: Existing research was systematically assessed with a focus on the following areas of community health: the school environment, the built environment, community facilities, the point of sale environment, and the use of taxes or fees to pay for nutritional health policies and reduce the consumption of unhealthy products.

Conclusions:

- Schools should implement district wide healthy food and beverage policies that



establish nutrition standards, regulate vending machines and create a healthy vending program.

- Communities can use local laws or polices to change zoning requirements, expand access to community facilities for recreational use, limit or ban the sale of non-nutritious food, and impose fees and taxes to dedicate funds towards obesity prevention.
- Financial resources generated from taxing non-nutritious food should be spent in low-income areas to help reduce the disadvantage and disproportionate burden of overweight and obese health issues in these communities. This involves introducing measures such as farmers' markets, grocery stores, physical education programs, and increased access to parks and recreation facilities in low-income areas.

Recommendations for Future Research: No recommendations were articulated in the reference.

HBEP Policy Implications for Practice:

- Advocate for schools to adopt healthy food and drink policies, including the regulation of vending machines.
- Advocate for policies that restrict the sale of non-nutritious food, particularly in close proximity to schools.
- Prioritise the development of parks, recreational facilities and farmers' markets, especially in low-income areas.

Badland, H. and Schofield, G. (2005). 'Transport, urban design, and physical activity: An evidence-based update'. *Transportation Research Part D: Transport and Environment* 10(3): 177-196.

Key Words: Urban design; urban environment; physical activity behaviour.

Location: The authors are from New Zealand and USA; the literature reviewed is mostly from USA and Australia.

Aim: To develop an understanding of built environment influences on physical activity modalities. To systematically draw together the evidence surrounding neighbourhood differences and traffic calming effects based on urban design fundamentals, the

impact of the localised environment for at risk populations, non-motorised travel characteristics, and measurement issues associated with merging physical activity, urban design, and transport research. To build on previous reviews on physical activity (Humpel et al. 2002 and Owen et al. 2004) and transport (Saelens et al. 2003 and Sallis et al. 2004).

Method: The article reviewed a total of 24 studies. The method for sourcing literature was not articulated.

Conclusions: The article lists several conclusions from the research, addressing neighbourhood differences, traffic calming measures, at-risk populations, non-motorised transport and measurement issues. Key urban design elements attributable to transport related physical activity are density, sub-division age, street connectivity and mixed land use.

Recommendations for Future Research: Consistent use of transport and health management tools, enhanced understanding of traffic calming measures and further collaboration between health, transport and urban design sectors.

HBEP Policy Implications for Practice:

- Promote higher residential densities in areas well serviced by public transport.
- Ensure street connectivity and mixed uses to encourage take-up of active transport modes.

References:

- Humpel, N., Owen, N. and Leslie, E. (2002). 'Environmental factors associated with adults: Participation in physical activity'. *American Journal of Preventive Medicine* 22(3): 188-199.
- Owen, N., Humpel, N., Leslie, E., Bauman, A. and Sallis, J. F. (2004). 'Understanding environmental influences on walking: Review and research agenda'. *American Journal of Preventive Medicine* 27(1): 67-76.
- Saelens, B. E., Sallis, J. F. and Frank, L. D. (2003). 'Environmental correlates of walking and cycling: Findings from the transportation, urban design, and planning literatures'. *Annals of Behavioral Medicine* 25(2): 80-91.
- Sallis, J. F., Frank, L. D., Saelens, B. E. and Kraft, M. K. (2004). 'Active transportation and physical activity: Opportunities for collaboration on transportation and public health research'. *Transportation Research Part A: Policy and Practice* 38(4): 249-268.

Bartolomei, L., Corkery, L., Judd, B. and Thompson, S. M. (2003). *A bountiful harvest: Community gardens and neighbourhood renewal in Waterloo*. NSW Department of Housing and University of New South Wales, Sydney, Australia.

Key Words: Community garden; neighbourhood renewal; public housing.

Location: The authors are from Australia; the study focus is on Sydney, Australia.

Aim: To understand the role of community gardens in fostering community development and neighbourhood improvement in a public housing context.

Method: The study used observation, in-depth individual interviews and focus group approaches. The available documentary evidence from the records of the various stakeholder groups was reviewed, as was the literature on community gardens in Australia and overseas to ascertain their roles, especially in disadvantaged communities.

Conclusions:

- Community gardens can make a positive contribution to community development in public housing estates.
- The community garden provides a place for friendship and generosity, cultural connection and understanding.
- People from different ethnic and cultural backgrounds work side-by-side, sharing garden practices, produce and recipes has helped to break down cultural barriers between tenants of the Estate, forge new friendships, as well as providing cultural continuation of gardening traditions from previous countries of residence.
- Leadership within and beyond the garden can be an important path through difficulties, as can garden management protocols and the development of cultural understandings.
- The community garden enabled tenants to reduce their food costs through growing and eating their own produce. It also provided access to produce which can be difficult to obtain.
- The garden produced health benefits through physical activity and reducing stress through providing purpose with ongoing participation and as a relaxing activity.
- The gardens made a significant contribution to the beautification of the open spaces around the residential tower blocks, and became an important part

of the daily lives of those involved in gardening activities.

Recommendations for Future Research: No recommendations were articulated in the reference.

HBEP Policy Implications for Practice:

- Pursue development of community gardens in public housing estates.
- Ensure community garden projects are well resourced and managed.
- Collaborate with other agencies to establish community gardens. (Other agencies might include local councils; schools; TAFE colleges; botanical gardens; gardening groups; recycling and sustainability groups).
- Involve the community in the planning, establishment and management of gardens.

Barton, H. (2009). 'Land use planning and health and well-being'. *Land Use Policy* 26S: S115-S123.

Key Words: Spatial planning; healthy urban planning; healthy towns; physical activity and planning.

Location: The author is from the World Health Organization (WHO) Collaborating Centre for Healthy Urban Environments, University of the West of England, Bristol, UK. The review focuses on research from the USA, UK, Europe and Australia.

Aim: The article is a review commentary on the state of research into land use planning and its relationship to health. Barton generally discusses the impact of planning on health on various policy areas such as active commuting, lifestyle and physical activity, economic and market influences, and mental wellbeing.

Method: The methodology used was not systematic but the article provides a good generalised commentary, which concludes with some positive predictions on where the discipline is heading.

Conclusions: The relationship between land use planning and health is extremely complex however there is research suggesting that the land use patterns exhibited in the UK, USA and Australia (low density, poor connectivity, spatial segregation, etc.) is impacting on mental and physical health. Barton makes an interesting point that the research in the UK and USA seems to somehow be 'missing the point' – citing comparative studies of



UK experience with specific cities and neighbourhoods in Germany, France, the Netherlands and Scandinavia. Such studies are showing experimental evidence of behaviour which contrasts with that found in the UK, amongst populations that are in other ways quite similar.

Recommendations for Future Research:

'My belief is that the inter-linkage of health and spatial planning research literature will continue apace, and progressively leave little excuse for inaction. A major shift in political priorities, however, will be necessary if action is to be effective. Part of that shift will be increased autonomy and financial muscle for local authorities, so that they can innovate and shape the future of their communities to a much greater degree, as we see in continental European examples. Also necessary is a shift in the control of land for development, so that vested interests do not dominate over the common good' (Barton 2009, p. S121).

Barton goes on to predict the following developments in the discipline:

- *Integrated settlement theory:* Current research is hampered by the inadequacy of human settlement theory. Each discipline provides its own perspective but they are not integrated. Various attempts have been made to integrate them, none yet fully convincing. The next 40 years will see the development of an integrated theory of settlement function, form and evolution. It will be based in eco-system theory, linking human activity and wellbeing with development processes, the structure of the built environment and the natural bioregion.
- *Normative planning strategies:* Partly as result of the integrated theory, and partly as a result of gathering comparative evidence from around the globe, clear normative principles will be identified in relation to the processes of urban governance and decision-making and the spatial structures that are successful at delivering healthy, sustainable human settlements. These principles are already being articulated but not are widely accepted.
- *Health well-being and spatial planning:* Much more research will be undertaken to help us understand the links between health and urban land use, including strategic policies for housing, commerce and transport. This is still a new research arena. The areas of uncertainty will be progressively reduced, and the more significant determinants of health will be separated from less critical factors. The relative significance of, and dynamic relationship between, social, cultural, environmental and economic drivers of personal behaviour will be much better understood.
- *Population, social mix and health inequalities:* The evidence will become compelling that if long-term productivity, health and quality of life for all (avoiding the crippling societal costs of poor health) are priorities, then the social structure of population within a neighbourhood or town is a matter of central policy concern. The socially polarised geographies in the UK which result from current housing mechanisms and urban forms will be condemned as exacerbating social and health inequalities and for their high cost to society.
- *Lifestyle: Physical activity and the built environment:* the growing but still contended evidence that urban form, settlement patterns and local environments have a major impact on behaviour, especially the levels of physical activity and therefore obesity, will be full and clear. The significance and dangers of obesogenic environments – again with a cost tag which will influence the Treasury – will be accepted. Local greenspace, retail, social and educational facilities, and the cycling routes and walkways which give access to them, will become recognised as important for public health and wellbeing.
- *Community networks, mental wellbeing:* The still uncertain relationship between community networks, the physical environment and mental wellbeing will have been sorted. There will be a recognition that it is impossible to generalise about this topic, because of the increasingly diverse patterns of social connection which people have. Nevertheless, for those who are obliged, or choose, to live locally, the importance of local facilities and casual pedestrian meetings will be established. In an ageing population, with more retired people, this will be especially important.
- *Children, education and locality:* The crisis brought on by a generation of obese children becoming adults, with consequent health problems, will focus the minds of politicians and academics. There will be research showing that it is vital for children to experience their environment, engage in active play and free socialising, and learn about the world, in the context of a more holistic

educational approach, if they are to be happy and healthy. The dangers of exaggerated fear of strangers, fortress schools and car-dependence will be accepted – though the aftermath of the current situation will still impede progress.

HBEP Policy Implications for Practice:

- Advocate for adequate resourcing of local government to enact effective healthy built environment policy and action.
- Modify land use patterns to enable greater accessibility to local facilities.
- Support local destinations through provision of attractive, safe, connected and direct walking and cycling routes.
- Ensure equitable access to natural open space.



Bauman, A. E. and Bull, F. C. (2007). *Environmental correlates of physical activity and walking in adults and children: A review of reviews.* National Institute of Health and Clinical Excellence, London, UK.

Key Words: Environmental correlates; physical activity; adults; children; physical environment.

Location: The authors are from the UK; the study focus is international.

Aim: To identify papers which report factors associated with physical activity in children and adult populations.

Method: The methodology involved a search of literature from multiple databases to identify published papers reporting on factors associated with physical activity in children and adult populations. Only 13 papers met the inclusion criteria and were used in the study. Reviews were excluded if their focus was not on physical activity.

Conclusions:

- Understanding the correlates and determinants of physical activity is essential in the development of a comprehensive population-based approach to the promotion of physical activity.
- This study indicates there is less review-level evidence on the associations between walking and physical environments than the evidence base for

overall physical activity.

Recommendations for Future Research: No recommendations were articulated in the reference.

HBEP Policy Implications for Practice:

- Encourage inter-disciplinary collaboration between academics, policy makers and professional staff from health and built environment backgrounds.
- Work to reach consensus about standardised but adaptable measurement of the built environment and physical activity.

Berry, H. (2007). ‘“Crowded suburbs” and “killer cities”: a brief review of the relationship between urban environments and mental health’. *NSW Public Health Bulletin* 18(11-12): 222-227.

Key Words: Urban environments; mental healthy psychosocial stressors; concentrated disadvantage; social drift.

Location: The author is from the Australian National University (ANU) Canberra, Australia; the study reviews literature from around the world, however, there is a focus on Australia.

Aim: To briefly review studies linking disadvantaged urban environments with poor mental health and to propose an explanatory model to guide future research.

Method: This is a general, non-systematic review/commentary on existing literature.

Conclusions: The article discusses the physical and social ‘incivilities’ that can impact on mental health in city environments. Physical incivilities include derelict buildings, graffiti, litter, excessive traffic and dirty streets. Social incivilities include over-crowding, unemployment, gangs and crime. Berry concludes there are three explanations for the direct and indirect associations between urban environments and mental health: psychosocial stressors (for example, diminished feelings of safety and security in one’s home can be considered stressors leading to strain which can erode positive self concepts), concentrated disadvantage (this suggests that the density of city populations concentrates physical and social problems, intensifying their effects and inflating pressures on mental health) and social drift (the socio-economic circumstances of people with severe and enduring mental health problems gradually

deteriorates, necessitating relocation into progressively disadvantaged neighbourhoods and lower quality accommodation – it is almost like self selection for the mentally ill – disadvantaged by their illness results in having to live in sub-standard neighbourhoods which in turn results in further stress etc.). This three pronged approach is after Galea (2005).

Recommendations for Future Research:

- A systematic investigation and development of sophisticated conceptual models that describe how features of the social and built environments of Australian cities may be related to mental health is required.
- Frameworks must (a) be theory based, empirically tested and continuously refined, (b) be constructed within a population health approach, with prevention in mind, and with interventions evaluated via ‘report card[s]’ that are not reliant on primary data collection and are ‘grounded’ in local realities, and (c) include health-promoting features of built environments, such as contact with nature and easy access to parks and walking.
- The fields of social ecology and community psychology, together with social capital theory, could contribute to an understanding of how cities influence mental health.

HBEP Policy Implications for Practice:

- Pursue policies to eliminate graffiti, litter, dirty streets and derelict buildings.
- Promote casual surveillance of streets to ensure safety.

References:

Galea, S., Ahern, J., Rudenstine, S., Wallace, Z. and Vlahov, D. (2005). ‘Urban built environment and depression: A multilevel analysis’. *Journal of Epidemiology and Community Health* 59(10): 822-827.

Black, J. L. and Macinko, J. (2008). ‘Neighborhoods and obesity’. *Nutrition Reviews* 66(1): 2-20.

Key Words: Built environment; food availability; neighbourhood; obesity.

Location: The authors are from the USA; the literature reviewed is from around the world.

Aim: To comprehensively assess the literature

on neighbourhood determinants of obesity in high-income countries while exploring the following questions:

- Is obesity associated with neighbourhood level factors such as Socio-Economic Status (SES), income inequality, racial composition, food availability, or physical activity resources?
- Is neighbourhood SES associated with access to health promoting resources (e.g. access to healthy food, opportunities for physical activity) or obesity-promoting exposures (e.g. high calorie foods, promoters of sedentary behaviours)?
- What theoretical and empirical gaps remain in the literature on neighbourhoods and obesity?

Method: The literature review was conducted from August 2005 through March 2007 by systematically searching the PubMed and PsychInfo databases. The inclusion criteria consisted of:

- Outcome variables including a measure of body weight, physical activity, or diet.
- Independent variables including a neighbourhood-level measure or assessment of a social, behavioural, or demographic predictor of obesity, and
- The study was conducted in a human population in an industrialised country.
- Only English-language articles were reviewed.

Conclusions:

- Even after controlling for individual-level SES, the literature consistently demonstrates that living in an economically deprived neighbourhood increases one’s odds of being obese or having higher Body Mass Index (BMI).
- Three studies found that area-SES was significantly associated with weight status for women but not for men, suggesting a potential mediating role of gender.
- Nine studies in the United States have demonstrated that access to stores selling healthy food is worse for low-income neighbourhoods. However, the existence of ‘food deserts’ has been challenged.
- Evidence from studies conducted in the United States, Britain, and Australia suggests that lower-SES neighbourhoods, and those with larger minority populations have greater exposure to fast-food restaurants and fewer healthy choices in local eateries.
- Individuals with a lower SES and level

of education are more likely to be sedentary, but decreased neighbourhood opportunities for physical activity could contribute to these trends.

- Land use, improved access to fitness facilities, and neighbourhood 'walkability' have all been linked to improved physical activity behaviours and reduced body weight.
- Those who can easily walk from home to commercial areas (i.e., in neighbourhoods with 'mixed land use') demonstrate lower BMI and increased walking and physical activity.
- Access to facilities is associated with increased physical activity for children, adolescents, adults, and the elderly. Increased walking and physical activity have also been reported for those with better access to high-quality open and green space. These factors are also significantly associated with body weight.
- Perceived hazards, such as fear of crime or violence and traffic may also have deleterious effects on fitness and BMI.
- The study goes on to propose a framework, based on the literature, for understanding how neighbourhoods influence body weight and obesity.

Recommendations for Future Research:

- Macro-level social factors, especially neighbourhood level SES, are among the most commonly studied predictors.
- Study multiple neighbourhood predictors: Few studies have tested a comprehensive model of the determinants of obesity at the neighbourhood level. Instead, most have assessed single items or at best a limited set of either 'good' (e.g. access to healthy foods and walkability) or 'bad' characteristics (e.g. poverty, exposure to fast food and crime). As a consequence, the overall neighbourhood effect on obesity may have been over- or underestimated.
- The potential impact of proximity of schools to fast food outlets on children's future attitudes and intake remain unstudied.
- While different theories have been applied to explain dietary and exercise behaviours, little empirical work has assessed how neighbourhood characteristics help to shape residents' knowledge, attitudes, norms, expectancies or intentions to be active or to make healthy food choices.

- Cross sectional study design does not facilitate establishment of true causality between risk factors and outcomes. These inconsistencies have led some to posit that the observed associations between the health of neighbourhoods and the health of people living in them are not factual.
- Many of the studies reviewed used secondary data and these often ended up with inadequate measures of outcomes and exposures. For example, two-thirds of the studies reviewed used self-reported measures of weight and height, but these have been shown to under-estimate obesity in most populations.
- Improved rationale is needed to justify how neighbourhoods are defined. Although the terms neighbourhood, area, context, and community are often used synonymously, defining a neighbourhood or relevant geographic area to study is complex and varies widely in the literature. Explicit rationale for the choice of neighbourhood metric will improve study comparability and clarify the meaning of different neighbourhood boundaries and measures.
- Further work is needed to parse out the interactions among individual-level characteristics and neighbourhood context. Are some individuals or groups more susceptible or more resilient to neighbourhood influences than others?
- Additional work is needed to understand how food-insecure and low-income individuals actually obtain food.
- Acquiring adequate, nutritious food requires an input of resources, including time, transport and money. It is unclear how people make tradeoffs for the competing demands on these resources. The complexity of these tradeoffs and how people make decisions about where, when, and how often they will purchase food and the choices they make in stores remains relatively under investigated and could benefit from integration of theories and methods from other fields such as economics and psychology.
- Although the studies described here support the argument that a number of contextual factors are associated with obesity, questions remain about which neighbourhood factors would be the most efficacious targets for intervention. Improved theory and targeted empirical work will be needed to translate research findings into more effective public health interventions.



HBEP Policy Implications for Practice:

- Focus obesity interventions on economically deprived areas.
- Ensure equitable access to fresh and healthy food.
- Use land use regulation to avoid concentration of fast-food outlets.
- Ensure equitable access to high-quality open and green space.
- Promote programs aimed at encouraging safe streets.

Brownson, R. C., Haire-Joshu, D. and Luke, D. A. (2006). 'Shaping the context of health: A review of environmental and policy approaches in the prevention of chronic diseases'. *Annual Review of Public Health 27*: 341-370.

Key Words: Policy; diet; exercise; physical activity; tobacco.

Location: The authors are from the USA; the articles reviewed are from around the world.

Aim: To describe (a) effective and promising interventions to address tobacco use, physical activity, and healthy eating and (b) lessons learned from the literature and practice experience in applying environmental and policy approaches. The review focuses on primary prevention of chronic diseases – that is, risk reduction among asymptomatic persons to reduce the likelihood of development of chronic disease.

Method: A total of 17 interventions were reviewed and categorised into three domains affecting the physical environment/access, economic environment and communication environment. The paper goes on to discuss tobacco use, physical activity and healthy eating in the context of these three domains.

Conclusions: The paper concludes that change is best pursued as follows:

- *Start with Environmental and Policy Interventions:* Policy and environmental change is key to initiating and sustaining systematic change. In many cases, control of chronic diseases is most effective if environmental and policy approaches are the earliest focus of change. These approaches can be low cost, high reach, and tend to provide supportive environment for later targeted interventions. Before implementing an array of individual-level programs to

prevent chronic diseases, practitioners should consider the power of environmental and policy approaches to set the stage for other interventions.

- *Think Comprehensively and Across Multiple Levels:* Comprehensive interventions that address multiple levels of an ecological framework are more effective.
- *Make Use of Economic Evaluations:* In one of the few economic evaluations in physical activity, Wang et al. 2004 examined the cost of trail development per trail user in Lincoln, Nebraska. The annual cost per user was \$235 (range = from \$83 to \$592), whereas per capita annual medical cost of inactivity was \$622. Studies like these supply powerful information for health advocates and policy makers.
- *Understand Local Context:* To better understand feasibility, assessment of local context is essential. The local context for an intervention should be assessed in conjunction with local data and with information on how to apply interventions found in systematic reviews (like the US Government's Community Guide).
- *Build New and Non-traditional Partnerships:* Successful implementation of environmental and policy interventions will require new skills and non-traditional partnerships with people and organisations not working directly in public health. For example, to address the major structural barriers to physical activity in US cities, urban planners, transportation experts, and persons working in parks and recreation are essential collaborators in developing the environment and the political will for activity-friendly communities.
- *Address Health Disparities:* Most of the existing intervention literature has been conducted among ethnic majority populations and higher-income populations. A challenge for the application of environmental and policy strategies involves a better understanding of how interventions apply within populations with large health disparities.

Recommendations for Future Research:

- Many communities lack the local data on chronic diseases and their risk factors for priority setting and program evaluation. This issue is beginning to be addressed (e.g. state wide risk factor data) but remains a serious constraint at the county, city, and neighbourhood levels.

- Opportunities for policy research may take a number of forms: (a) identifying relevant policies (surveillance); (b) understanding the determinants of establishing policy; (c) exploring the process of developing and establishing policy; and (d) assessing the outcomes of policy implementation. In these studies, the policy can be either the independent or dependent variable.
- In mainstream epidemiology, the most rigorous design for hypothesis testing is the randomised controlled trial. However, a randomised design is seldom useful in policy research because the scientist cannot randomly assign exposure (the policy). Therefore, quasi-experimental designs (e.g. ecologic studies and time-series designs) are likely to be more useful for many policy-relevant issues. Policy research can still be sophisticated in the absence of randomised designs.



HBEP Policy Implications for Practice:

- **Pursue a social ecological approach to encourage physical activity, community connections and healthy eating.**
- **Including modifications to the built environment with other policy innovations such as educational programs.**
- **Support interdisciplinary collaborations between health and built environment professionals.**

References:

Wang, G., Macera, C. A., Scudder-Soucie, B., Schmid, T., Pratt, M., Buchner, D. and Heath, G. (2004). 'Cost analysis of the built environment: The case of bike and pedestrian trails in Lincoln, Neb'. *American Journal of Public Health* **94**(4): 549-553.

Brownson, R. C., Hoehner, C. M., Day, K., Forsyth, A. and Sallis, J. F. (2009). 'Measuring the built environment for physical activity: State of the science'. *American Journal of Preventive Medicine* 36(4): S99-S123.

Key Words: Built environment; physical activity; public health; built environment measures.

Location: The authors are from the USA; the article reviews studies from around the world.

Aim: To assist in developing an understanding of the best ways to measure the impact of the built environment on physical activity. To understand the influences of the built environment on physical activity, a wide range of environmental measures is needed. There are currently three categories of built environment data being used: (a) perceived measures obtained by telephone interview or self-administered questionnaires; (b) observational measures obtained using systematic observational methods (audits); and (c) archival data sets that are often layered and analysed with Geographical Information Systems (GIS). This review provides a critical assessment of these three types of built-environment measures relevant to the study of physical activity.

Method: Instruments were identified through searches of the literature, expert input, and feedback from a 2007 workshop. A critical assessment is provided of perceived measures, observational (audit) approaches, and GIS-derived metrics.

Conclusions: The study presents a comprehensive listing of the main tools and studies using (a) perceived measures obtained by telephone interview or self-administered questionnaires; (b) observational measures obtained using systematic observational methods (audits); and (c) archival data sets that are often layered and analysed with GIS. Recommendations are listed to improve the data collected by each different method.

The general conclusion of the study is that while there have been considerable advances in the development of measurement of the built environment for physical activity in all three categories, numerous challenges are identified in the study which will only be overcome by continued research effort which will require dedicated funding.

Recommendations for Future Research:

- *Simplifying the task by a process of elimination:* The complexity of the built environment constructs targeted by these first-generation measures and the resulting long lists of variables is a major impediment to widespread use and efficient analysis. Before current measures can be simplified they must be used in multiple studies and variables repeatedly unrelated to outcomes or found to be redundant with other variables can be deleted.

- *Standardisation of scales:* The measures reviewed here use a variety of geographic scales. For example, definitions of neighbourhood or community vary, and different GIS-based buffer sizes. For GIS measures, it would be useful if more investigators evaluated and reported results using multiple geographic scales (e.g. 0.5-, 1-, 2-, 3 kilometre buffers).
- *The detail required to assess built environment quality:* A specific limitation of observed and GIS-derived measures is the difficulty of assessing the quality of environmental features. The difficulty of obtaining reliable reports of simple indicators of quality of such attributes as playground equipment, trail conditions, and street crossing aids illustrates a need for further development of existing measures.
- *Need to factor in minority groups:* It is not clear to what extent the existing environment measures are sensitive to the needs of various population groups and settings. It is likely that physical activity barriers and facilitators vary by age, physical abilities, and culture. The lack of relevance of existing measures to rural environments has been acknowledged, and environmental attributes may have different meanings in low and high-income communities and in youth versus adults. It is most important to ensure that environmental measures are relevant to populations at highest risk of inactive lifestyles and resulting diseases, such as low-income, racial/ethnic minority, older adult, and rural populations.
- *Policy development:* In contrast to the rapid development of built environment measures, there is a void in published measures of policies that govern built environments (note 172 – Librett et al. 2003). This policy relevant information is a clear research need.
- *Consensus on evidence and data required:* Spatial measures require different statistical approaches than do familiar public health data, and the complexity of the measures creates additional challenges, so training and consensus development about the most appropriate analytic approaches are needed.
- *Maximising the potential of GIS:* Geographic Information Systems data have the potential to be a useful public health surveillance tool, but that potential is largely unrealised. Some public health departments will not have the capacity to collect even the most basic data, so partnerships with transportation, planning, parks and recreation, law enforcement, and housing agencies will likely be required to provide access to data.
- *Practical measures for community groups:* Creating practical measures for community groups should be a goal for researchers. The incorporation of reliable and valid observational measures into health advocacy efforts should be encouraged to provide an evidence base for advocacy.

HBEP Policy Implications for Practice:

- Support interdisciplinary collaborations between health and built environment professionals aimed at reaching consensus about standardised but adaptable measurement of the built environment and physical activity.

References:

Librett, J.J., Yore, M.M., and Schmid, T.L. (2003). 'Local ordinances that promote physical activity: A survey of municipal policies.' *American Journal of Public Health* **93**: 1399-1403.

Burke, M., Hatfield, E. and Pascoe, J. (2008). *Urban planning for physical activity and nutrition: A review of evidence and interventions. Research Paper 22. Urban Research Program, Griffith University, Brisbane, Australia.*



Key Words: Urban planning; physical activity; nutrition, built environment.

Location: The authors are from Brisbane, Australia; the study focus is on Australia.

Aim: To assess the relationships between active transport/incidental activity, nutrition and individual/community health and the role of environmental attributes in influencing these relationships. To explore how can governments use policy and legislation to influence positive physical activity and nutrition outcomes.

Method: The study uses existing research to discuss the environmental determinants of physical activity and nutrition. This research paper explores in detail the complex relationship of urban form and health, urban access to nutritional food, changes to the built environment to improve health and government's role in creating healthy environments.

Conclusions:

- The built environment can be modified to improve health through a comprehensive approach to changing policy and practice. Examples include more compact development patterns by clustering development at transport nodes and improving urban streets and public spaces by offering a quality walking a cycling environment.
- In order to address access to healthy, nutritious food, community based options such as community gardens, food cooperatives and edible landscapes should be explored and encouraged. Land use planning to limit the number of fast-food outlets and increase the number of fresh

food retailers would also function to improve access to fresh food.

- Governments should look for ways to encourage active transport and incidental physical activity as this presents an opportunity to embed physical activity in to the daily lives of urban populations.

Recommendations for Future Research: Research is required to review of the effectiveness of government interventions in the built environment that target nutrition. Are restrictive policies, such as limiting densities of fast-food outlets, an effective approach for improving community health in the Australian context? Trials of these policies are required to ensure they are worthwhile.

Monitoring and evaluation of current projects such as bicycle share schemes or increasing pedestrian-only zones and shared streets should also be undertaken to assess whether they are having an impact on the health of the population.

HBEP Policy Implications for Practice:

- Encourage community based initiatives that support higher rates of physical activity and access to healthy food.
- Carefully encourage more compact development patterns, particularly around transport nodes.
- Promote community gardens, food cooperatives and edible landscapes in urban settings.

Burns, C. M. and Inglis, A. D. (2007). 'Measuring food access in Melbourne: Access to healthy and fast foods by car, bus and foot in an urban municipality in Melbourne'. *Health and Place* 13(4): 877-885.

Key Words: Food; fast-food; mapping; socio-economic disadvantage.

Location: The authors are from Australia; the study focus is on Melbourne, Australia.

Aim: To assess the access to healthy and unhealthy foods throughout a municipality in Melbourne using a Geographic Information Systems (GIS) accessibility program. To assess the access to healthy and unhealthy foods throughout a municipality in Melbourne using a Geographic Information Systems (GIS) accessibility program.

Method: The study was carried out in the City of Casey, a municipality located in South-east Melbourne, Australia. The City has a population of 180,000 and covers 395 square kilometres including urban, semi-rural, rural and coastal areas. The study included three major supermarket chains and several major fast-food chains, resulting in a total of 15 supermarkets and 33 fast-food outlets. Accessibility of these food outlets was modelled through a GIS program from information sourced from the City of Casey Council. The GIS program used multiple layers to model costs and distances for walking, public transport and car use to access food.

Conclusions:

- This method for assessing food access could be applied to a range of health related behaviours to describe community food access.
- The study indicated that access to healthy food in the City of Casey is acceptable provided a resident has a car. To ensure all residents of Casey have good access to healthy food, improvements to the public transport system are required, as is increased support for residents without cars or those with disabilities.
- Obesity prevention strategies in Casey should concentrate on making healthy and affordable food choices available at fast-food outlets and town planning to ensure a mix of food outlets to maximise the likelihood of healthy food choices.

Recommendations for Future Research: To understand variations in fast-food availability across areas of high and low socio-economic disadvantage. Their methodology offers a good contextual basis for further socio-cultural

research and examining the socio-cultural processes around urban development.

HBEP Policy Implications for Practice:

- Improve public transport accessibility to healthy food destinations including supermarkets.
- Introduce measures to increase availability of healthy food at fast-food outlets.
- Employ land use regulation to avoid the concentration of fast-food outlets.

Butterworth, I. (2000). *The relationship between the built environment and wellbeing: A literature review.* Victorian Health Promotion Foundation, Melbourne, Australia.

Key Words: Built environment; wellbeing; urban health; community.

Location: The author is from Australia; the review has a specific focus for the Victorian (Labor) government of the time but cites an array of literature from other around the world.

Aim: The overarching aim of the review is unclear. It is a general review written by an environmental and community psychologist for the Victorian Health Promotion Foundation. The review is old but puts some interesting perspectives on the relationships between social health, the built environment and health. The review is not systematic, and organises data under the headings of: aesthetics of place, the psychological impact of loss of place, the need for interventions to foster sense of place, legibility and orientation, built form and sense of community, transport and physical activity, safety and danger, privacy and crowding, participation and empowerment.

Method: The study employs a general, not systematic methodology.

Conclusions: Enhanced citizen participation and leadership is required to revitalise the social and physical quality of our urban spaces. There is room for children to learn and be educated about their urban environment, so that they in turn can participate in the process of managing and living in their urban environment. It is also suggested that education for adults is equally if not more pressing, given adults' ability to vote and their greater potential to influence decision-making.

Recommendations for Future Research: No specific recommendations were provided.

HBEP Policy Implications for Practice:

- Involve children and the community in the design of urban spaces.

Cao, X. Y., Mokhtarian, P. L. and Handy, S. L. (2009). 'Examining the impacts of residential self-selection on travel behaviour: A focus on empirical findings'. *Transport Reviews* 29(3): 359-395.

Key Words: Travel behaviour; traditional neighbourhood; built environment.

Location: The authors are from the USA (Cao is from the University of Minneapolis; Handy and Mokhtarian are from the University of California, Davis). The review mostly focuses on US based research, however, some articles are also cited from Europe to provide comparison.

Aim: Previous studies have consistently found a significant association between the Built Environment (BEnv) and Transport Behaviour (TB) (the most commonly cited is Ewing and Cervero 2001 – a meta analysis of 50 studies exploring influences of the built environment on travel behaviour). However, association itself is insufficient to establish causality. To robustly infer causality, scientific research generally requires at least four kinds of evidence (Schutt 2004; Singleton and Straits 2005): association (a statistically significant relationship), non-spuriousness (a relationship that cannot be attributed to another variable), time precedence (cause precedes effect) and causal mechanism (a logical explanation for why the alleged cause should produce the observed effect) (refer to Cao et al. 2008 for a detailed discussion on the requisites for causal inference in the context of the BEnv and TB). The goal of research regarding self-selection is to rule out 'spuriousness' in the establishment of a causal relationship between the BEnv and TB, and ultimately to determine the magnitude of this relationship. Such evidence provides a basis for the adoption of policies that aim to change TB by changing the BEnv. The existence of self-selection doesn't mean that the BEnv is irrelevant, but it must be accounted for in estimating the effect of the BEnv on TB if we want to be able to produce valid estimates of the impact of land use policies on behaviour.

Method: The article reviews 38 empirical studies, which collectively have taken nine different approaches to assessment of residential self-selection. The identification of

the studies was based on the knowledge of the authors.

Conclusions: 'If the key question is, 'Does the BEnv have a distinct influence on TB after self-selection is accounted for?', then based on the empirical evidence to date, the answer would have to be a simple and resounding 'yes' (Cao et al. 2009, p. 389). Virtually every quantitative study reviewed, after controlling for self-selection, identified a statistically significant influence of one or more BEnv measures on the TB variable of interest.

In summary, once a walking-oriented person moves to a walking-oriented environment, we would expect them to walk more. But it is also good to know, from a policy standpoint, that when an auto-oriented person moves to a walking-oriented environment, we can expect them to walk somewhat more as well. It is more difficult, however, to assess the strength of the autonomous influence of the BEnv relative to the influence of self-selection, or even to ascertain whether that autonomous influence is 'large enough to matter' on its own terms. Self-selection is, however, still an important factor that needs to be taken into account in any empirical study. 'It is misleading to present empirical results that do not take that impact into account. Such faulty findings are likely to result in flawed policies, and/or an overestimation of their effectiveness' (Cao et al. 2009, p. 390).

Recommendations for Future Research:

Two types of studies are important (both of them ideally to include comparison groups of unaffected individuals similar in other relevant ways): (1) True panel studies of residents who move from one type of neighbourhood to another, with measurements of attitudes as well as socio-demographic traits and TB before and after, and further exploration of the reasons behind the move; and (2) Natural experiments that examine the impact on TB in response to a change in the BEnv, such as the implementation of a traffic calming programme. The conceptual ideal is the longitudinal structural equations modelling approach, which can combine most of the strengths of the other methods: measurement of attitudes, allowance of multiple directions of causality and measurement at multiple points in time. The study also indirectly infers that more research needs to concentrate on the impact of the BEnv at the regional scale (as opposed to the neighbourhood scale) inferring that this scale is most likely more influential on TB.



HBEP Policy Implications for Practice:

- Design streets that are navigable, have safe and well maintained foot paths and are shaded to encourage walking.

References:

Cao, X., Mokhtarian, P. L. and Handy, S. L. (2008). 'Examining the Impacts of Residential Self-Selection on Travel Behavior: Methodologies and Empirical Findings'. Research Report No. UCD-ITS-RR-08-25. University of California – Davis, California, USA. Available at: http://pubs.its.ucdavis.edu/publication_detail.php?id=1194 (accessed 1 August 2008).

Ewing, R. and Cervero, R. (2001). 'Travel and the built environment: a synthesis'. *Transportation Research Record* 1780: 87-113.

Schutt, R. K. (2004). 'Investigating the Social World: The Process and Practice of Research'. 4th edn. Pine Forge Press, Thousand Oaks, California, USA.

Singleton Jr., R. A. and Straits, B. C. (2005). 'Approaches to Social Research'. 4th edn. Oxford University Press, New York, USA.

Cavill, N., Kahlmeier, S., Rutter, H., Racioppi, F. and Oja, P. (2008). 'Economic analyses of transport infrastructure and policies including health effects related to cycling and walking: A systematic review'. *Transport Policy* 15(5): 291-304.

Key Words: Economic; health; walk; cycle.

Location: The authors are from a UK consulting group and the World Health Organization (WHO) Regional Office for Europe; the articles reviewed are from the UK and Europe with just two studies from the USA included. No studies from Australia were reviewed.

Aim:

- To review published and unpublished studies that present the findings of an economic evaluation of an aspect of transport infrastructure or policy and included data on walking and/or cycling and health effects in the evaluation. Studies had to be in the public domain, all age groups were included and papers from languages other than English were translated.
- To propose options for the further development of a more harmonised methodology as guidance for Member States (European) on approaches to the inclusion of health effects through transport-related physical activity

in economic analyses of transport infrastructure and policies.

Method: The method is well detailed in the article. The authors searched multidisciplinary databases using combinations of search terms well documented in Appendix D of the review. Sixteen studies were selected for inclusion. Studies needed to be an economic evaluation of an aspect of transport infrastructure or policy and include data on walking and/or cycling and health effects in the evaluation. Studies also had to be in the public domain. All age groups were included and papers from languages other than English were translated. Studies not included were listed in the review with reasons given as to why they were not included.

Conclusions:

- Economic analysis to incorporate health outcomes into the standard cost-benefit analyses undertaken by transport and other infrastructure planners are required to justify policy change. In 2006, the WHO Regional Office for Europe undertook a project on economic valuation of health effects from cycling and walking building on extensive work by the WHO and partners on cost effectiveness. One of the main conclusions of this work has been that 'there is a serious lack of cost-effectiveness studies for all types of environmental health interventions, and therefore decision makers have limited information on the relative cost-effectiveness of health interventions from which to make evidence-based decisions' (WHO 2002, p. vi).
- The studies reviewed were very heterogeneous and presented a wide variety of results using different outcome measures, making it difficult to summarise the findings. However, there were two measures that were frequently reported: benefit-cost ratios and the value attributed to each new cyclist or walker on a trail or as a result of a policy.
- The review concludes that cost-benefit analyses of cycling and walking infrastructure generally produce positive benefit-cost ratios – eight authors produced 16 benefit-cost ratios for various cycling/walking projects, and only one was negative. In other words, many of the studies were able to clearly demonstrate benefits outweighing costs associated with walking and cycling and this is obviously very powerful data. There were no studies reviewed from Australia. It is possible such studies have been conducted in Australia since this article was published.



Recommendations for Future Research:

- The methods for conducting economic analyses of cycling and walking projects should be sound and transparent: it is only when they are evaluated using the same methods as used on other transport projects that their high value becomes apparent.
- One of the most significant challenges is the relationship between observed cycling or walking and total physical activity. Ideally, models should refer to continuous data on energy expenditure regardless of how it was accrued. Such data are rarely available. One study by Rutter (2006), overcame this obstacle by using relative risks for cycling which controlled for leisure time physical activity. This neatly avoids the issue of activity substitution (the notion that additional activity in one domain such as cycling may be associated with reduced activity in another) and means that any model can focus on the benefit accruing from the activity of cycling itself.
- There is a need for a more harmonised approach to the inclusion of health effects related to physical activity through cycling and walking in economic analyses of transport infrastructure and policies.
- 'Since transport policy decisions are taken every day and sometimes on approaches that often lack transparency and scientific rigour, an approach based on the best available evidence seems opportune at this stage' (Cavill et al. 2008, p. 298). The study by Rutter (2006) has identified an approach that appears to have the greatest potential thus warranting further development to lead to a more uniform approach. Follow-up work to this review has focused on developing guidance and a model based on this approach using relative risks for cycling which controlled for leisure time physical activity as best available evidence to date in the absence of models based on energy expenditure (WHO Regional Office for Europe, 2007).

HBEP Policy Implications for Practice:

- Use the results of cost benefit analysis to justify policies facilitating walking and cycling.

References:

Rutter, H. (2006). *Mortality Benefits of Cycling in London*. Transport for London, London, UK.

World Health Organization (WHO) (2002). *Considerations in evaluating the cost-effectiveness of environmental health interventions*. World Health Organization, Geneva, Switzerland.

World Health Organization (WHO) Regional Office for Europe (2007). *Economic assessment of transport infrastructure and policies: Methodological guidance on the economic appraisal of health effects related to walking and cycling*. WHO Regional Office for Europe, Copenhagen, Denmark. Available at: http://www.euro.who.int/transport/policy/20070503_1S (accessed 1 November 2007).

Cohen, D. A., Inagami, S. and Finch, B. (2008). 'The built environment and collective efficacy'. *Health and Place* 14(2): 198-208.

Key Words (from reference): Collective efficacy; alcohol outlets; parks; fast-food; Health disparities; built environment.

Location: The authors are from the USA; the study focus is on Los Angeles, USA.

Aim: To assess whether environmental features are the foundation for or the etiology of personal reports of neighbourhood collective efficacy.

Method:

- The study analysed data from the Los Angeles Family and Neighbourhood Study (LAFANS) together with geographical data from Los Angeles County to determine which social and environmental features were associated with personal reports of collective efficacy.
- Multi-level modelling was used when controlling for age, education, annual family income, sex, marital status, employment and race/ethnicity at the individual level.
- At the tract level, disadvantage, the number of off-sale alcohol outlets per roadway mile, the number of parks and the number of fast-food outlets within the tract and within half a mile of the tract's boundaries, were all controlled.

Conclusions:

- Increased alcohol outlet store density showed an association with lower levels of collective efficacy, but because density of off-sale alcohol outlets is highly correlated with tract disadvantage, the independent association of alcohol outlets to collective efficacy could not be teased out in the hierarchical model.

- Living in a neighbourhood with more parks is strongly associated with higher levels of reported efficacy.
- There is an association between features of the environment and perceptions of neighbourhood social functioning that may indirectly influence health outcomes.
- The number of fast-food establishments and number of elementary schools were not linearly associated with levels of collective efficacy.
- By improving social and neighbourhood conditions such as social disadvantage and increasing the number of parks this will result in an increase in collective efficacy and potentially lead to reductions in premature deaths.

Recommendations for Future Research: No recommendations were articulated in the reference.

HBEP Policy Implications for Practice:

- Employ land use regulation to control concentrations of alcohol outlet stores.
- Provide well managed and safe public open spaces.

Coveney, J. and O'Dwyer, L. A. (2009). 'Effects of mobility and location on food access'. *Health and Place* 15(1): 45-55.

Key Words: Food desert; car use; food shopping; qualitative research; health inequalities.

Location: The authors are from Australia; the study focus is on Adelaide, Australia.

Aim: To explore the extent to which the combination of not having a car and the location of households impose on inequalities to food access. The study was set within the context of food security, which includes the 'ready availability of nutritionally adequate, safe foods, and the assured ability to acquire them in socially acceptable ways' (Kendall and Kennedy 1998 cited in Coveney and O'Dwyer 2009, p. 46). The authors aimed to compare households that were located within a food desert with those living outside a food desert and to examine the imposition placed on households by not having access to a car.

Method: In-depth interviews with respondents without private transport living within and outside food deserts in Adelaide, South Australia. Food deserts were identified using Geographic Information Systems (GIS) to measure availability and accessibility of major

chain supermarkets in four Local Government Areas (LGA) in Adelaide. Sixteen households without cars were recruited for the study. Interviews were conducted in participants' homes by one of a team of three interviewers during 2005. The interviews were audio-taped and transcribed. The respondents in the total sample came from a variety of socio-economic positions and family situations, ranging from single-member households, single-parent and two-parent households, with or without children of a variety of ages. Respondents were aged between 20 and 70.

Conclusions:

- The research found that living in a food desert did not, by itself, impose food access difficulties. Far more important was access to independent transport to shops.
- A number of features were identified including reliance on supermarkets, difficulties with public transport, and the provision of government schemes and systems that for some made food shopping much easier.
- The research suggests that food access problems in Adelaide are not necessarily the product of geographic distance between home and shop, more so the social or welfare networks that allow people to access private transport.
- The use of neighbourhood volunteers, carers, and taxi voucher systems which compensate for a lack of private transport for the disabled or infirm was an unexpected outcome from this research, and there are lessons that may be learned from this that can be applied to other disadvantaged groups.

Recommendations for Future Research:

Research into how compensatory factors such as taxi vouchers, volunteers and carers (of the disabled) can help to overcome the disadvantage of living without viable transport to access healthy food.

HBEP Policy Implications for Practice:

- Ensure widespread access to a variety of food shops via public transport systems.

Crawford, D. A., Timperio, A. F., Salmon, J. A., Baur, L., Giles-Corti, B., Roberts, R. J., Jackson, M. L., Andrianopoulos, N. and Ball, K. (2008). 'Neighbourhood fast food outlets and obesity in children and adults: The CLAN Study'. *International Journal of Pediatric Obesity* 3(4): 249-56.

Key Words: Access; availability; adults; children; energy-dense foods; fast-foods; foods outside home.

Location: The authors are from Australia; the study is based in Australia.

Aim: To examine associations between density of and proximity to fast-food outlets and body weight in a sample of children and their parents.

Method: Children's measured and parents' self-reported heights and weights were used to calculate Body Mass Index (BMI). The locations of major fast-food outlets were geocoded. Bi-variate linear regression analyses examined associations between the presence of any fast-food outlet within a two-kilometre buffer around participants' homes, fast-food outlet density within the two-kilometre buffer, and distance to the nearest outlet and BMI. Each independent variable was also entered into separate bi-variate logistic regression analyses to predict the odds of being overweight or obese.

Conclusions: Among older children, those with at least one outlet within two-kilometres had lower BMI z-scores. The further that fathers lived from an outlet, the higher their BMI. Among 13-15 year old girls and their fathers, the likelihood of overweight/obesity was reduced by 80 percent and 50 percent, respectively, if they had at least one fast-food outlet within two-kilometres of their home. Among older girls, the likelihood of being overweight/obese was reduced by 14 percent with each additional outlet within two-kilometres. Fathers' odds of being overweight/obese increased by 13 percent for each additional kilometre to the nearest outlet. While consumption of fast-food has been shown to be associated with obesity, this study provides little support for the concept that exposure to fast-food outlets in the local neighbourhood increases risk of obesity.

Recommendations for Future Research: No recommendations were articulated in the reference.

HBEP Policy Implications for Practice:

- There are no conclusive policy implications from this research.

Davison, K. K., Werder, J. L. and Lawson, C. T. (2008). 'Children's active commuting to school: Current knowledge and future directions'. *Preventing Chronic Disease* 5(3): A100.

Key Words: Walking; cycling; children; school; physical activity.

Location: The studies sourced are from the USA, Australia and UK but the data is interpreted from a USA perspective.

Aim: 1) to examine research on the health consequences of active commuting to school, 2) to summarise pertinent studies on predictors of children's active commuting to school, and 3) outline and evaluate programs specific to children's active commuting to school.

Method: Literature on children's active commuting to school published before June 2007 was compiled by searching PubMed, PsycINFO, and the National Transportation Library databases; conducting internet searches on program-based activities; and reviewing relevant transportation journals published during the last four years. The inclusion criteria consisted of: a study sample composed of children 18 years or younger and published in English in the four years prior to 2007. Grey literature search methods were used to fulfil goal three of the review (to evaluate children's active commute to school programs).

Conclusions:

- Children who walk or bicycle to school have higher daily levels of physical activity and better cardiovascular fitness than do children who do not actively commute to school. There is evidence that this is linked to school days (Tudor-Locke et al. 2003 and Sirard et al. 2005), indicating that children who actively commute to school are not necessarily more active on other days. Possible health benefits for children of walking and bicycling to school illustrate the need to further examine ways to promote active commuting in this population.
- A wide range of predictors of children's active commuting behaviours was identified, including demographic factors, individual and family factors, school factors, and social and physical environmental factors. School and community factors associated with school location, such as distance to school, population density in the immediate area of a school, and school enrolment levels, have been consistently linked



with active commuting rates. Research examining characteristics of the physical environment suggests that children are more likely to walk or bicycle to school when the route to school is direct (Timperio et al. 2006), navigation of steep roads is minimal (Timperio et al. 2006), and neighbourhoods in which children live are deemed 'walkable' (as measured by residential density, retail floor area ratio, intersection density, and land use mix) (Kerr et al. 2006, McMillan 2007). In contrast to characteristics of road and sidewalk infrastructure, most studies find no association between perceived traffic safety and children's active commuting (Timperio et al. 2006, Kerr et al. 2006). In terms of social environment, mixed results have been identified for studies assessing perceived crime and safety, however studies show that children are more likely to walk or bicycle to school when parents perceive that other children in the area actively commute (Timperio et al. 2006).

- Safe Routes to School and the Walking School Bus are two public health efforts that promote walking and bicycling to school. Although evaluations of these programs are limited, evidence exists that these activities are viewed positively by key stakeholders and have positive effects on children's active commuting to school.

Recommendations for Future Research:

- Future efforts to promote walking and bicycling to school will be facilitated by building on current research, combining the strengths of scientific rigor with the predesign and postdesign provided by intervention activities, and disseminating results broadly and rapidly.
- This could be facilitated by development of standardised instruments and variable definitions to allow for comparative studies, provide a repository for the data (e.g. a secure Web site hosted by an academic institution), and develop a reporting platform that will make 'lessons learned' available as quickly as possible.
- Few studies have examined the effects of extreme cold and heat on children's commuting patterns.
- Little research has focused on social environmental predictors of children's active commuting to school.
- Continued dialogue among public health professionals, local planners, and community members is required.
- Limits: All studies on predictors of active

commuting used a cross-sectional design. There is a lack of standardised definition and measurement of active commuting. The issue of poorly conceptualised predictor variables is highlighted by a large number of studies that found significant associations between commuting patterns and the variables classified as 'other,' indicating that important variables may be at play that have yet to be addressed and that research techniques, such as the use of focus groups, may be an important first step in determining which variables are important for further analysis. Finally, many of the predictor variables were assessed only in a single study, thereby limiting the conclusions.

HBEP Policy Implications for Practice:

- Provide well marked, aesthetically pleasing, safe and direct routes to schools.
- Avoid steep slopes in designing routes to schools.
- Co-locate schools with other destinations such as community facilities, shops and services.
- Involve key stakeholders, including public health professionals, planners and the community, in the development of policies.

References:

Kerr, J., Rosenberg, D., Sallis, J. F., Saelens, B. E., Frank, L. D. and Conway, T. L. (2006). 'Active commuting to school: Associations with environmental and parental concerns'. *Medicine and Science in Sports and Exercise* 38(4): 787-794.

McMillan, T. E. (2007). 'The relative influence of urban form on a child's travel mode to school'. *Transportation Research Part A* 41(1): 69-79.

Sirard, J. R., Riner, W. F. Jr., McIver, K. L. and Pate, R. R. (2005). 'Physical activity and active commuting to elementary school'. *Medicine and Science in Sports and Exercise* 37(12): 2062-2069.

Timperio, A., Ball, K., Salmon, J., Roberts, R., Giles-Corti, B., and Simmons, D. (2006). 'Personal, family, social, and environmental correlates of active commuting to school'. *American Journal of Preventive Medicine* 30(1): 45-51.

Tudor-Locke, C., Ainsworth, B. E., Adair, L. S. and Popkin, B. M. (2003). 'Objective physical activity of Filipino youth stratified for commuting mode to school'. *Medicine and Science in Sports and Exercise* 35(3): 465-471.

Dunton, G. F., Kaplan, J., Wolch, J., Jerrett, M. and Reynolds, K. D. (2009). 'Physical environmental correlates of childhood obesity: A systematic review'. *Obesity Reviews* 10(4): 393-402.

Key Words: Adolescents; children; environment; obesity.

Location: The authors are from the USA; the study focus is on the USA.

Aim: To report on the results of a systematic review of quantitative research examining built and biophysical environmental variables associated with obesity in children and adolescents through physical activity.

Method: Relevant quantitative studies examining the relationship between built and biophysical environments and childhood obesity were identified through literature searches using PubMed, PsychInfo and Geobase. Searches consisted of at least one of 20 selected environment terms and one of 11 obesity related terms. All combinations of pairs (consisting of obesity and environment terms) were searched. After the selection criteria were applied only 15 studies were available for review.

Conclusions:

- For children, associations between physical environmental variables and obesity differed by gender, age, socio-economic status and population density.
- Access to equipment and facilities, neighbourhood pattern and urban sprawl were associated with obesity outcomes in adolescents.
- Targeting specific areas for intervention such as the physical characteristics of school environments is important for reducing the prevalence of obesity in young people as children spend a significant amount of time in this setting.
- The research found a weak association with children's use of community features, such as parks and recreational facilities, with obesity outcomes. The authors suggest using promotional strategies to enhance the use of these resources.
- The focus should be on identifying modifiable environmental factors that can be readily translated into population-level interventions and policies.
- A systematic review of the literature on the built and biophysical correlates of obesity in youth revealed a small but diverse number of studies representing a broad range of study populations, designs, measures and outcomes.

Recommendations for Future Research:

The authors found the current research is inconsistent across most of the environmental variables considered. Consequently, future research should strive for consistency in the types of variables, measures, buffer sizes and control variables used.

They recommend incorporating the impact of the qualitative environmental characteristics and considering the joint contributions of available facilities and travel routes to those locations. Also, future studies should attempt to utilize longitudinal, quasi-experimental and experimental research designs in order to better sort out the direction of causality between environments and obesity outcomes. Lastly, mediators and moderators of the relationship between physical environments and obesity need to be explored (including interactions between different levels of the environment) in order to guide more theoretically sound and hypothesis-driven research in this area.



HBEP Policy Implications for Practice:

- Allow access to playgrounds and other open spaces in school grounds outside of school hours.
- Tailor playground spaces to different ages and genders and different neighbourhood characteristics.
- Ensure quality equipment is installed in children's playgrounds.
- Involve children in the development of spaces for recreation.

Evans, S. (2009b). ' "That lot up there and us down here"; Social interaction and a sense of community in a mixed tenure UK retirement village'. *Ageing and Society* 29(2): 199-216.

Key Words: community; retirement village; diversity; older people.

Location: The author is from the UK; the study focus is on the UK.

Aim: This article reports a study of a retirement village that has attempted to integrate residents from a range of socio-economic backgrounds by making various tenures available in the same development.

Method:

- The study was carried out between October 2004 and March 2006 using a case study methodology.

- Data was collected in three ways from different sets of informants. Invitations to be interviewed were delivered to all the village residents apart from 15 people living in the specialist dementia unit in the care home.
- Of the 37 who agreed to be interviewed, 27 lived in lease-purchase apartments, six in the extra-care housing, and four in the care home. Those who agreed to take part were also asked to complete an adapted version of the *How is Your Home?* questionnaire.
- Additional data was collected to measure a broad range of health and social care needs.
- The interviews were transcribed and the content analysed by coding phrases into categories themes and sub-themes.

Conclusions:

- There was a strong sense of belonging among the residents but most identified with their own section rather than the development as a whole.
- Social interaction was the most important factor in a sense of community. For many residents, this centred on a range of organised events and activities as well as the use of communal facilities in the village.
- The fact that tenures occupied separate physical areas of the village exacerbated the differences in social backgrounds and interests.
- Casual, everyday social interactions amongst residents are an important element in people's sense of community.
- The built environment was a key element in the development of social networks among residents.
- Physical barriers such as the villages' design to separate areas through socio-economic backgrounds resulted in residents identifying a sense of community in relation to the area of the village in which they lived rather than the overall village.

Recommendations for Future Research: No recommendations were articulated in the reference.

HBEP Policy Implications for Practice:

- Promote social interaction through community events.
- Provide communal facilities for incidental and organised interactions.

Ewing, R. and Cervero, R. (2010). 'Travel and the Built Environment: A Meta Analysis'. *Journal of the American Planning Association* 76(3): 265-294.

Key Words: Vehicle miles travelled (VMT); walking; transit; built environment; effect sizes.

Location: The authors are from the USA; the literature reviewed is from around the world.

Aim: To conduct a meta-analysis of the built environment-travel literature existing at the end of 2009 in order to draw generalisable conclusions for practice – to generalise the effect of land use planning and urban design strategies on reductions in automobile use and related social and environmental costs. The study aimed to quantify effect sizes, update earlier work, include additional outcome measures, and address the methodological issue of self-selection. The study claims to focus on non-work related travel.

Method: This is an update of the landmark 2001 study by the same authors (Ewing and Cervero 2001). The 2001 study only looked at VMT and vehicle trips as outcomes whereas this more recent study adds walking and transit use as outcomes of interest. Studies linking the built environment to travel were identified through various multidisciplinary databases using the keywords 'built environment,' 'urban form,' and 'development,' coupled with keywords 'travel,' 'transit,' and 'walking.' In addition, data from the of the Transportation Research Board's annual programs were reviewed for relevant papers, leading researchers in the subject area were contacted for copies of their latest research and a call for built-environment/travel studies on academic online forums was made.

Inclusion criteria were that studies needed to quantitatively analyse effects of the built environment on travel choices, control statistically for confounding influences on travel behaviour, apply statistical tests to determine significance of various effects, be based on sizeable samples and contain numerical data available for computing effect sizes. Fifty articles were selected for inclusion and the study went on to compute actual elasticities for individual studies and pooled them to produce weighted averages.

Conclusions: At least 38 studies using nine different research approaches have attempted to control for residential self-selection. Nearly all of them found 'resounding' evidence of statistically significant associations between the built environment and travel behaviour, independent of self-selection influences. However, nearly all of them also found that residential self-selection attenuates the effects of the built environment on travel.

There are at least 12 surveys of the literature on the built environment and travel. There are 13 other surveys on the built environment and physical activity, including walking and bicycling. There is considerable overlap among these reviews, particularly where they share authorship. The literature is now so vast it has produced two reviews of the many reviews.

Travel variables are generally inelastic with respect to change in measures of the built environment. Of the environmental variables considered here, none has a weighted average travel elasticity of absolute magnitude greater than 0.39, and most are much less. Still, the combined effect of several such variables on travel could be quite large. Consistent with prior work, we find that vehicle miles travelled (VMT) is most strongly related to measures of accessibility to destinations and secondarily to street network design variables. Walking is most strongly related to measures of land use diversity, intersection density, and the number of destinations within walking distance. Bus and train use are equally related to proximity to transit and street network design variables, with land use diversity a secondary factor. Surprisingly, we find population and job densities to be only weakly associated with travel behaviour once these other variables are controlled. Several variables that often go hand-in-hand with population density have elasticities that are well above that of population density — in other words, it is not density itself that leads to a decrease in VMT or increase in walking but the land use mix and accessibility that this density justifies.

Recommendations for Future Research:

The elasticities derived in this meta-analysis may be used to adjust outputs of travel or activity models that are otherwise insensitive to variation in the built environment, or be used in sketch planning applications ranging from climate action plans to health impact assessments. However, because sample sizes are small, and very few studies control for residential preferences and attitudes, planners should generalise broadly from the results of this study. While these elasticities are as accurate as currently possible, they should be understood to contain unknown error and have unknown confidence intervals. They provide a base, and as more built-environment/travel studies appear in the planning literature, these elasticities should be updated and refined.

HBEP Policy Implications for Practice:

- Provide local destinations by allowing mixed uses.
- Support grid like streets with high intersection densities.
- Improve regional access to public and active transport infrastructure.
- Coordinate built environment modifications with other programs and policy changes.

References:

Ewing, R. and Cervero, R. (2001). 'Travel and the built environment: a synthesis'. *Transportation Research Record* 1780: 87-113.

Ewing, R. and Dumbaugh, E. (2009). 'The built environment and traffic safety: A review of empirical evidence'. *Journal of Planning Literature* 23(4): 347-367.

Key Words: Traffic safety; built environment; urban sprawl; street design.

Location: The authors are from the USA; the literature reviewed is mostly US based.

Aim: A non-systematic (but comprehensive) review of the impact of the built environment on traffic safety.

Method: The method used was non-systematic but based on the comprehensive knowledge of the authors.

Conclusions: The key finding of the review is that more compact regional forms have the ability to reduce VMT to levels that also reduce population-level crash incidence. Further, the review concludes that research has consistently found inverse relationships between the Four D's (Density, Diversity, Design and Destination Accessibility) and traffic accidents (i.e. >D's = <accidents). The review is helpful in that it proves that 'healthy built environments' are essentially also safe traffic environments.

Recommendations for Future Research:

- Develop an understanding of how regional development patterns influence total travel and trip making, and how the resulting travel patterns in turn influence population-level crash exposure.
- Re-examine how the design and configuration of individual communities may influence crash incidence. The prevailing theory of community design aims to increase safety via disconnected



residential subdivisions that eliminate neighbourhood cut-through traffic. It is likely that the safety gain achieved through the elimination of neighbourhood traffic is offset by crash increases on arterial thoroughfares however this hypothesis needs to be researched.

- Develop an understanding of how design influences the behaviour of specific roadway users, and how these behaviours in turn influence crash incidence. Modifications in the built environment can profoundly influence vehicle speeds and traffic conflicts, which in turn have a profound effect on crash incidence. Yet there has been little research aimed at relating specific pre-crash behaviours to the environments in which they occur, and almost no attempt to understand how the characteristics of the built environment may encourage, or discourage, these behaviours from occurring in the first place.

HBEP Policy Implications for Practice:

- Consider the future amenity of residents in the design and location of increases in density.
- Support the development of co-location policies for residential, commercial and employment uses, while considering residential amenity. This includes provision of privacy, reductions in exposure to noise, and access to natural open spaces.

Faulkner, G. E. J., Buliung, R. N., Flora, P. K. and Fusco, C. (2009). 'Active school transport, physical activity levels and body weight of children and youth: A systematic review'. *Preventive Medicine* 48(1): 3-8.

Key Words: Active transportation; school; physical activity; body weight.

Location: The authors are from Canada; the literature reviewed is from the USA, Europe, New Zealand, Australia and the Philippines.

Aim: To review studies of active transport to schools and establish whether active transport results in lower bodyweight and increased physical activity among students.

Method: The authors conducted a systematic review of published research on whether children who actively commute to school also have a healthier body weight. Online searches

of five electronic databases were conducted. Potential studies were screened on the basis of objective measures of physical activity. Thirteen studies met the criteria for inclusion and were reviewed.

Conclusions:

- Active transport to school supplements overall physical activity levels among children, with active commuters reporting significantly higher levels of physical activity than those who travel by motorised transport. However there was little evidence to suggest a relationship between active transport to school and healthier body weight/Body Mass Index (BMI) among children. The studies including measures of body weight/ BMI reveal that the difference in body weight/BMI between active and passive commuters was seldom significant and not supported in the long term.
- While there is insufficient evidence to link active transport to school with healthy body weights for children and youth, a focus on active school transport is still appropriate given that adequate participation in physical activity during childhood and adolescence could be critical to the prevention of chronic disease later in life.

Recommendations for Future Research: A focus on active school transport is appropriate given that adequate participation in physical activity during childhood and adolescence could be critical to the prevention of chronic disease later in life. Research is required to assess how active transport to school can facilitate increased changes in daily physical activity over the long term.

HBEP Policy Implications for Practice:

- Encourage children's active transport to school.

Feng, J., Glass, T. A., Curriero, F. C., Stewart, W. F. and Schwartz, B. S. (2010). 'The built environment and obesity: A systematic review of the epidemiologic evidence'. *Health and Place* 16(2): 175-190.

Key Words: Built environment; contextual effects; food environment; land use; obesity.

Location: The authors are from the USA; the literature reviewed is from the USA, Australia, Canada and Europe.



Aim: To present a systematic and quantitative assessment of an updated body of literature focusing on conceptual, methodological and inferential issues associated with the built environment and obesity. The study seeks a particular emphasis on evaluating associations across studies and aims to shed light on key methodological challenges.

Method: Fifty three papers were sourced from a database search. The search was restricted to English language studies only with studies using diet or physical activity only as outcomes or examining only demographic or social characteristics as exposure variables excluded (i.e. studies needed to have a built environment metric and a weight related outcome). The 53 papers were then classified by various variables (built environment domain examined, location, population, context, way of defining context (e.g. use of census tracts or use of individually defined geographic areas), cross sectional/longitudinal). The focus was then narrowed to 22 studies which defined 'place' as either: 'contextual' studies (looking at specific variables within specific geographic units) or 'geographic buffer' studies (which defined place by geographic buffers using distances deemed to be behaviourally relevant – e.g. walkable distance).

Conclusions: Built environment metrics reported by three or more studies were density, fast-food density, walkability, land use mix and 'county sprawl index'. There is very little consistency in measures of the built environment in particular – 'the most striking feature of this study is the absence of agreement on how the built environment should be measured and modelled' (Feng et al. 2010, p. 180). 'Lack of heterogeneity in place could explain the absence of associations' (Feng et al. 2010, p. 180) – in other words, places are different and therefore associations will be different.

Recommendations for Future Research:

- Greater understanding of the role of the built environment needs to be facilitated before the 'supportive environment with accessible and affordable healthy food choices and opportunities for regular physical activity' (Burdette and Whitaker 2004 cited in Feng et al. 2010, p. 186) required to decrease overweight and obesity can be provided. A better understanding of the 'metrics' of the built environment needs to happen through inter- and cross-disciplinary collaborations. This will enable systematic evaluation across studies.
- The study also mentions the 'black box of place' (after Macintyre et al. 2002) and suggests that the biggest

obstacle to health and place research is inappropriate spatial scale – too often obesity literature takes the easy way out by using administratively defined spatial units rather than more sociologically valid places.

- Longitudinal studies need to be pursued.
- Further collaboration across disciplines needs to be supported to 'narrow in on the key features of the built environment that are contributing to the obesity epidemic' (Feng et al. 2010, p. 187).

HBEP Policy Implications for Practice:

- Support interdisciplinary collaborations between health and built environment professionals.

References:

Macintyre, S., Ellaway, A. and Cummins, S. (2002). 'Place effects on health: How can we conceptualise, operationalise and measure them?'. *Social Science and Medicine* 55 (1), 125-139.

Ferreira, I., van der Horst, K., Wendel-Vos, W., Kremers, S., van Lenthe, F. J. and Brug, J. (2007). 'Environmental correlates of physical activity in youth – a review and update'. *Obesity Reviews* 8(2): 129-154.

Key Words: Adolescents; children; environment; physical activity.

Location: The authors are from the Netherlands; the literature reviewed is primarily from the USA.

Aim: To review literature on environmental factors associated with physical activity (PA) in youth.

Method: The authors undertook a systematic semi-quantitative review of 150 studies on environmental correlates of youth PA published in the past 25 years. The Analysis Grid for Environments Linked to Obesity (ANGELO) framework was used to classify the environmental correlates studied (see Kirk et al. 2010 for an explanation of ANGELO).

Conclusions: Most studies retrieved used cross-sectional designs and subjective measures of environmental factors and PA. Variables of the home and school environments were especially associated with children's PA. Most consistent positive correlates of PA were father's PA, time spent outdoors and school PA-related policies (in children), and support

from significant others, mother's education level, family income, and non-vocational school attendance (in adolescents). Low crime incidence (in adolescents) was characteristic of the neighbourhood environment associated with higher PA. Convincing evidence of an important role for many other environmental factors was, however, not found.

Recommendations for Future Research:

Further research should aim at longitudinal and intervention studies, and use more objective measures of PA and its potential (environmental) determinants.

HBEP Policy Implications for Practice:

- Consider the importance and influence of parental physical activity levels in designing programs for children's physical activity.
- Provide well managed public open spaces for physical activity.
- Ensure spaces for children's physical activity are safe from traffic and crime.

References:

Kirk, S. F. L., Penney, T. L. and McHugh, T. L. F. (2010). 'Characterizing the obesogenic environment: The state of the evidence with directions for future research'. *Obesity Reviews* 11(2): 109-117.

Frost, S. S., Goins, R. T., Hunter, R. H., Hooker, S. P., Bryant, L. L., Kruger, J. and Pluto, D. (2010). 'Effects of the Built Environment on Physical Activity of Adults Living in Rural Settings'. *American Journal of Health Promotion* 24(4): 267-283.

Key Words: Built environment; physical activity; rural; walking; prevention research.

Location: The authors are from the USA; the study focus is on the USA.

Aim: To conduct a systematic review of the literature to examine the influence of the built environment (BEnv) on the physical activity (PA) of adults in rural settings.

Method: The authors conducted key word searches of Academic Search Premier, PubMed, CINAHL, Web of Science, and Sport Discus. Some of the search terms were: 'rural built environment', 'rural adults', 'physical environment'. Studies included in the research were published prior to June 2008 and assessed one or more elements of

the BE. The studies were required to examine the relationships between the BE and PA, and focused on rural locales. Objective(s), sample size, sampling technique, geographic location, and definition of rural were extracted from each study. The methods of assessment and outcomes were extracted from the quantitative literature, and overarching themes were identified from the qualitative literature.

Conclusions:

- Research in this area is limited. Associations among elements of the BE and PA among adults, however, appear to differ between rural and urban areas.
- The elements of the environment which appear to positively influence PA in the rural environment include: aesthetics, safety from crime and traffic, and presence of recreational facilities, trails or parks.
- When comparing urban and rural studies, urban areas showed a positive relationship between parks, sidewalks and walkable destinations with PA.

Recommendations for Future Research:

Considerations for future studies should include the identification of parameters to define rural as well as longitudinal research, incorporating diverse geographic sampling. The development and refinement of BE assessment tools specific to rural locations are also required.

HBEP Policy Implications for Practice:

- In rural areas prioritise provision of safe and aesthetically pleasing recreational facilities, trails and parks.
- In urban areas, prioritise provision of a variety of parks, well maintained footpaths and walkable destinations.

Galvez, M. P., Pearl, M. and Yen, I. H. (2010). 'Childhood obesity and the built environment'. *Current Opinion in Pediatrics* 22(2): 202-207.

Key Words: Active commuting; BMI; diet; built environment; childhood obesity; neighborhood; physical activity.

Location: The authors are from the USA; the articles reviewed are from around the world.

Aim: To examine neighbourhood factors for their role in childhood obesity. To apply Ecological Systems Theory to the analysis of the impact of the built environment on childhood obesity.



Method: A search was conducted in PubMed, PsychInfo, Web of Science, and CINAHL using search terms related to the paediatric population, built environment, obesity measures, and obesity-related behaviour measures such as diet and physical activity. Articles were included that provided data on paediatric populations aged under 18 years, measured built environmental variables such as physical structures, walkability, or safety, and had specific outcome measures of childhood obesity or obesity-related behaviour such as diet or physical activity. Articles were excluded if they described future studies or methodological tools, were not relevant to developed countries, examined only large-scale geographic trends, or compared areas solely by urban and rural categories rather than at the individual child level. This left 48 recent articles measuring built environmental variables and obesity outcomes in children for analysis.

Conclusions: The review summarises articles on neighbourhood influence on childhood obesity under the categories of diet, physical activity, active commuting, neighbourhood walkability, obesity (general) and neighbourhood safety with a diverse array of findings – see article for more details.

Recommendations for Future Research:

- Interdisciplinary approach.
- Research into the impact of the built environment on children's dietary behaviours.
- Research into the impact of the built environment on childhood obesity on populations that vary by key socio-demographics including sex, race/ethnicity, income, while combining individual level dietary and physical activity behaviours, as well as subjective and objective measures of neighbourhood across urban, suburban and rural areas.

HBEP Policy Implications for Practice:

- There are no conclusive policy implications from this research.

Gebel, K., Bauman, A. E. and Petticrew, M. (2007). 'The physical environment and physical activity: A critical appraisal of review articles'. *American Journal of Preventive Medicine* 32(5): 361-369.

Key Words: Physical environment; physical activity; literature review.

Location: The authors are from Australia and the UK.

Aim: This paper systematically appraises methodologic aspects of literature reviews examining the relationship between physical activity and the physical environment published in peer-reviewed journals between 2000 and 2005. Eleven reviews and their antecedent source papers were examined. The observational evidence base on the physical environment and physical activity is substantial, and growing rapidly. Decision-making based on observational evidence is particularly difficult, given lack of guidance on what constitutes a good enough study in the absence of experimental evidence (Ogilvie et al. 2006).

Method: A literature search for systematic and narrative review papers published in English between 2000 and 2005 was conducted using the databases Medline, CINAHL, DARE/EBMR, PsycLit, Pub Med, Avery, and Transportation, along with hand searching of reference lists of identified studies. Also, reference lists compiled by the Active Living Research group were analysed. Reviews were included when authors investigated the relationship between any aspect of the physical environment (built and natural) and any form of physical activity for the adult population.

Conclusions: The majority of these reviews omitted between one third and two thirds of the studies that could have been eligible for inclusion at the time they conducted the review. Methodologic information on how the review was conducted was not always provided. Furthermore, in some cases results of a study were reported incorrectly, or physical environmental aspects were conflated with social environmental or cognitive factors. Moreover, when results were reported incorrectly, physical environmental variables were almost always reported as significantly associated with physical activity, when these associations were non significant, or were not assessed as part of the primary study.

Recommendations for Future Research:

Greater standardisation in the reporting of review methods may assist with future efforts to summarise studies of the relationship between physical environments and physical activity.

HBEP Policy Implications for Practice:

- Encourage inter-disciplinary collaboration between academics, policy makers and professional staff from health and built environment backgrounds.
- Work to reach consensus about standardised but adaptable measurement of the built environment and physical activity.

References:

Ogilvie, D., Mitchell, R., Mutrie, N., Petticrew, M. and Platt S. (2006). 'Evaluating health effects of transport interventions: Methodologic case study'. *American Journal of Preventive Medicine* 31(2): 118-126.

Gebel, K., King, L., Bauman, A., Vita, P., Gill, T., Rigby, A. and Capon, A. (2005). *Creating healthy environments: A review of links between the physical environment, physical activity and obesity*. NSW Department of Health and NSW Centre for Overweight and Obesity, Sydney, Australia.

Key Words: Physical environment; physical activity; obesity.

Location: The authors are from the New South Wales Department of Health and the New South Wales Centre for Overweight and Obesity, both of which are located in Sydney, Australia; the articles reviewed are from around the world.

Aim: To review existing studies and summarise existing systematic reviews supporting associations between urban environments, physical activity and obesity.

Method: The article reviews nine review papers which in turn examined 81 original source papers. The review also contains a comprehensive discussion on the links between the physical environment, physical activity and obesity and groups the discussion and the literature into the areas of: (a) development of an ecological framework for understanding on how environments influence physical activity, nutrition and weight status, (b) links between the physical environment and nutrition, and (c) links between the physical environment and physical activity. The review also has a comprehensive glossary.

Conclusions: Research into links between physical activity and health should not lose

sight of the fact that any change resulting from modifications to the built environment will only be seen if other changes occur to, for example, social norms and community understanding. Recent research has led to a better understanding of the kinds of environments likely to be associated with physical activity and improved measurement of these environments. There is also consistent evidence across countries, environments and settings, supporting the notion that the links between health and the environment are causal.

Recommendations for Future Research: Take advantage of opportunistic evaluations of the impacts of new urban development, new road and track systems and new housing estates in order to contribute to the evidence base required to support policy change.

HBEP Policy Implications for Practice:

- Pursue a social ecological approach to encouraging physical activity by including modifications to the built environment with other policy innovations such as educational programs.

Guite, H. F., Clark, C. and Ackrill, G. (2006). 'The impact of the physical and urban environment on mental well-being'. *Public Health* 120(12): 1117-1126.

Key Words: Physical environment; urban environment; built environment; housing; mental health.

Location: The authors are from the UK; the study focus is on London, UK.

Aim: To examine the strength of association between physical and social factors in the built environment and mental wellbeing, and to determine which factors are the most important.

Method: A postal survey based on a theoretical model of domains that might link the physical and urban environment with mental wellbeing was sent to 2,696 adults aged 18 years or over, in four areas of Greenwich, London. Participants were selected on the basis of living in a property in Greenwich that was currently or had previously been council owned or managed. Mental health was measured using the SF36 subscales for mental health and vitality. Additional household and area level data were appended for each respondent from a range of sources.



Conclusions: A total of 12 significant factors were identified within the environmental domains analysed. It was found that dissatisfaction with damp in the home, the aesthetic quality of the estate or road, neighbour noise, overcrowding in the home, access to green open spaces, access to community facilities, local social and entertainment facilities, safety in the neighbourhood (both during the day and at night), the presence of needles and syringes in the local neighbourhood, the number of places to stop and chat, and the number of social events in the community were associated with poor mental health. Further statistical analysis revealed that five of these factors remained significant when analysed across the domains and against confounding factors that could also influence mental health. These five factors included dissatisfaction with neighbour noise, overcrowding in the home, access to green open spaces, access to community facilities and daytime safety. 'This study confirms an association between the physical environment and mental well-being across a range of domains' and 'highlights the needs to intervene on both design and social features of residential areas to promote mental well-being' (Guite et al. 2006, p. 1118). Many of the study's findings are supported by other recent reviews, which are identified in the article.

Recommendations for Future Research:

- The authors highlight the inherent deficiencies of cross-sectional study designs and call for prospective studies of interventions to address the significant factors identified in the study.

HBEP Policy Implications for Practice:

- Devise a comprehensive policy framework to address all of the domains that influence mental health. Prioritise actions to reduce neighbour noise, alleviate household overcrowding, improve access a variety of green open spaces and community facilities, and address safety (both real and perceived).

Handy, S., Cao, X. and Mokhtarian, P. (2009). *Active travel: The role of self-selection in explaining the effect of built environment on active travel.* Robert Wood Johnston Foundation, Princeton, USA.

Key Words: Built environment; physical activity; active travel; neighbourhood design; walking; biking.

Location: The authors are from the USA; the research reviewed is mainly from the USA.

Aim: To detail findings of an array of studies on the effect of residential self-selection on active travel (i.e. walking and cycling for transport).

Method: This is an Active Living Research (ALR) general review, mainly of findings of previous studies done by the authors (in particular, see Cao, Mokhtarian and Handy 2009).

Conclusions: People who prefer to walk for transport live in 'Traditionally Designed Neighbourhoods' (TND) (i.e. with features of a healthy built environment including mixed use, grid like streets, open frontages and well maintained, safe places to walk). Regardless, people who live in TNDs still walk more than those living in suburban neighbourhoods. The study concludes that neighbourhood design has an impact on walking regardless of self-selection. The study also cites evidence to conclude that the demand for TNDs is increasing.

Recommendations for Future Research:

- Pursue longitudinal 'before and after' studies of the travel behaviour and attitudes of people moving from driving to walking oriented neighbourhoods.
- Examine how factors such as age, income and familial status impact people's ability to choose a walking oriented neighbourhood.

HBEP Policy Implications for Practice:

- Support traditional neighbourhood designs. These include mixed uses, mixed densities, grid like and navigable streets, open frontages, and well maintained and safe places in which to walk and cycle.

References:

Cao X., Mokhtarian P. and Handy S. (2009). 'Examining the impacts of residential self-selection on travel behavior: A focus on empirical findings.' *Transport Reviews* 29(3): 359-395.

Heath, G., Brownson, R. C., Kruger, D. J., Miles, R., Powell, K. E. and Ramsey, L. T. (2006). 'The effectiveness of urban design and land use and transport policies and Practices to Increase physical activity: A systematic review'. *Journal of Physical Activity and Health* 3: 243-253.

Key Words: Exercise; leisure activities; physical fitness; physical endurance; decision making, evidence-based medicine; economics; preventive health services; public health practice; meta-analysis; review literature; urban planning.

Location: The authors are from the USA; the literature reviewed is mostly US based.

Aim: To review environmental and policy interventions to promote physical activity under three broad category headings: community-scale urban design and land use policies and practices to increase physical activity; street-scale urban design and land use policies to increase physical activity; and transportation and travel policies and practices.

Method: The review is based on the methods of the independent 'Task Force on Community Preventive Services' (the Task Force). A multidisciplinary team developed a conceptual framework for organising and selecting each of the interventions under consideration and for choosing how to define the success of each intervention. A systematic search for evidence was performed using standard computer-based search engines. Each study that met the inclusion criteria was evaluated using a standard 'abstraction form' and assessed for suitability in terms of study design and validity of results. On the basis of the number of threats to validity, studies were characterised as having good, fair, or limited execution. Studies with limited execution were not included. Net intervention effects were calculated for all reported measurements of a given outcome. Often, different variables were used within a study to assess changes affecting the same outcome (e.g., changes in physical activity might be calculated by measuring times per week in physical activity, self-reported physical activity score, minutes per week in physical activity, or all three). Multiple measurements of the same outcome were examined for consistency. Medians were calculated as summary effect measures for each type of measurement and were compared across outcomes for consistency. Bodies of evidence of effectiveness were characterised as strong, sufficient, or insufficient on the basis of the number of available studies, the suitability of study designs for evaluating

effectiveness, the quality of execution of the studies, the consistency of the results, and the effect size.

Conclusions:

- *Community-scale urban design and land use policies, and practices in promoting physical activity* (defined as: interventions that use policy instruments such as zoning regulations and building codes, and environmental changes brought about by government policies or builders' practices. For example, policies encouraging transit-oriented development, addressing street layouts, the density of development, the location of more stores, and jobs and schools within walking distance of where people live). Twelve studies were identified. Weaknesses were that they were generally cross sectional studies, however, the review concludes there is sufficient evidence that community-scale urban design and land use regulations, policies, and practices can be effective in increasing walking and bicycling. Barriers to using community scale urban design and land use policies to promote physical activity include: (1) changing how cities are built given that the urban landscape changes relatively slowly, (2) zoning regulations that preclude mixed-use neighbourhoods, (3) cost of remodelling/ retrofitting existing communities, (4) lack of effective communication between different professional groups (i.e. urban planners, architects, transportation engineers, public health professionals, etc.), and (5) changing behavioural norms directed towards urban design, lifestyle, and physical activity patterns.
- *Street-Scale Urban Design and Land Use Policies and Practices to Increase Physical Activity* (defined as: policy instruments and practices to support physical activity in small geographic areas, generally limited to a few blocks. These policies and practices include features such as improved street lighting or infrastructure projects that increase sidewalk continuity). Six studies were identified. Each measured different types of interventions however based on the fact that each intervention related to either safety, aesthetics or access, the study was able to draw common conclusions. Most notably, that there is sufficient evidence that street-scale urban design and land use policies in small geographic areas (generally limited to a few blocks) is effective in increasing levels of physical activity. Barriers to

using street scale urban design and land use policies to promote physical activity include cost, coordination between authorities and professionals and in addition, community input is often required.

- *Transportation and Travel Policies and Practices* (defined as: interventions that strive to improve pedestrian, transit and light rail access, increase pedestrian and cyclist activity and safety, reduce car use, and improve air quality). Only one study with fair execution was found and the review concluded that there was not sufficient evidence to determine effectiveness of transportation and travel policy interventions in increasing physical activity or improving fitness.

Recommendations for Future Research:

Recommendations for future research were summarised under the following headings:

- **Measurement:**
 - What are the relationships between 'objective' and 'perceived' neighbourhood characteristics?
 - How should the built environment be conceptualised and what is the best way to measure or quantify components of the built environment (e.g., accessibility, aesthetics, safety, walkability)?
 - What is the optimal method for collecting self-reported data on physical activity and do those vary by domain (e.g., recreational vs. transport activity)?
 - How can existing GIS-derived data and other technologies such as movement sensors be used to improve the measurement abilities of future studies?
 - How best can we design longitudinal studies that account for the temporal sequence between 'exposure' to the environment and behaviour change?
- **Urban Design and Land Use Characteristics:**
 - What is the geographic scale(s) at which the neighbourhood environment is most strongly correlated with physical activity?
 - What are differences in the effectiveness of urban practices and policies, based on whether they are macro-level changes or micro-level changes (e.g., zoning changes in a community vs. adding street lights or sidewalks)?
- **Interaction of the Social and Physical Environment:**
 - How do these interventions apply in less populated or rural areas?
 - What characteristics of the built environment (e.g., land use mix, walkability, bike paths, improved street lighting, ease and safety of street crossing, sidewalk continuity, landscaping) best facilitate physical activity?
 - What effect does urban redevelopment have on physical activity levels of inner city residents?
 - What leads to effective collaboration across sectors as communities seek to promote physical activity?
 - Does multivariate adjustment for potential confounding factors (e.g., age, income, gender) change the relationship between the built environment, policies, and physical activity? If so, what potential confounders are most important?
 - What factors lead to an enhanced likelihood that policies friendly toward physical activity will be enacted and enforced?
 - Among elected officials, what are the key drivers in moving forward an agenda that supports activity-friendly communities?
 - How best can the various sectors (e.g., public health professionals, urban planners, travel behaviour researchers) collaborate to implement policies and practices that promote activity?
 - Does the built environment have similar effects on PA among the majority population, among diverse racial/ethnic, low SES, and various age and ability groups?
 - How well does perceived safety from crime coincide with objective measures of safety from crime? What explains any observed differences? How important are they in influencing physical activity? How should physical activity interventions address erroneous perceptions?
- **Economic Issues:**
 - What is the cost-effectiveness of each of these interventions and how can it be increased?
 - How can effectiveness in terms of health outcomes or quality-adjusted health outcomes be better measured, estimated, or modelled?



- Does making cities more walkable improve economic development?

HBEP Policy Implications for Practice:

- Policies encouraging physical activity should be embedded within a hierarchy of geographical scale. For example, policies encouraging walking at the neighbourhood scale need to connect to regional scale networks and programs.

HBEP Policy Implications for Practice:

- Promote behavioural change interventions based on educational programs to encourage cycling.
- Tailor cycling infrastructure to the local environment. For example, workplace showers are imperative in warmer climates and under cover cycle parking is crucial in climates where it snows.

Heinen, E., van Wee, B. and Maat, K. (2010). 'Commuting by bicycle: An overview of the literature'. *Transport Reviews* 30(1): 59-96.

Key Words: Transport; cycling; commuting; work; built environment.

Location: The authors are from the Netherlands; the research reviewed is from Europe, the USA, Canada and Australia.

Aim: To offer an overview of the academic literature on bicycle commuting.

Method: A general review of relevant literature was undertaken by the authors.

Conclusions: There are many determinants for whether people will commute by bicycle, not all of which are addressed by conventional mode choice studies and models. This suggests that predicting and influencing bicycle use needs to be grounded in other kinds of knowledge than those currently available for motorised forms of transport.

Recommendations for Future Research:

- Some environmental factors seem to have been left out of research into bicycle commuting — including the impact of slope, wind, pavement quality and infrastructure provision.
- Longitudinal studies are required.
- The importance of attitudes to cycling have been underestimated: 'From current research, it would appear that individuals in identical situations and in the same socio-economic groups choose to commute using different transport modes. This implies that an individual will base his or her choice not on an objective situation, but on their perception of that situation' (Heinen et al. 2010, p. 83).

Hillsdon, M., Foster, C. and Thorogood, M. (2005). 'Interventions for promoting physical activity'. *Cochrane Database of Systematic Reviews* 1.

Key Words: Physical activity; cardio-respiratory fitness; interventions.

Location: The authors are from the UK writing for the then UK Department of Health Services; the literature reviewed is from around the world but mostly relevant to the UK context (e.g., the USA, UK, Australia, other European countries).

Aim: This evidence briefing is a review of reviews about the effectiveness of public health interventions for increasing physical activity among adults. This is a review as part of the development of an evidence base of effective health improvement interventions related to physical activity. This briefing joins many other topic-based papers on the Health Development Agency (HDA) Evidence Base website. This briefing is intended to inform policy and decision makers, National Health Service (NHS) providers, public health physicians and other public health practitioners in the widest sense.

Method: This evidence briefing is a synthesis of high quality systematic reviews and meta-analyses to increase physical activity among adults. The briefing is not a systematic review of primary data. It employed the following parameters to identify the reviews included in the briefing:

- English language
- 1996 to November 2001
- Human studies
- Systematic reviews and meta-analyses
- Public health and primary care interventions to increase physical activity
- Adult populations (≥16 years old).

Ten systematic reviews and meta-analyses met this criterion.



Conclusions: There is no review-level evidence of the effectiveness of interventions aimed at changing policy or the built environment to promote physical activity. This review was limited to experimental or quasi-experimental study designs and excluded a substantial amount of literature from consideration. This lack of review level evidence does not mean there is absolutely no evidence of the effectiveness of policy and environmental modification, just that no evidence was found from systematic reviews that met the inclusion criteria. Prior to including other types of study designs into reviews such as this there will need to be an agreed method for systematically synthesising or reviewing such work.

Recommendations for Future Research: Due to the clinical and statistical heterogeneity of the studies, only limited conclusions can be drawn about the effectiveness of individual components of the interventions. Future studies should provide greater detail of the components of interventions.

HBEP Policy Implications for Practice:

- Support interdisciplinary collaboration to develop accepted standards of evidence and ways to analyse existing evidence to justify policy change.

Kaczynski, A. T. and Henderson, K. A. (2007). 'Environmental correlates of physical activity: A review of evidence about parks and recreation'. *Leisure Sciences* 29(4): 315-354.

Key Words: Active living; literature review; physical activity; social ecological models.

Location: The authors are from Canada and the USA; the study focus is on North America.

Aim: To review and critically examine evidence related to parks and recreation as features of the built environment and the relationship of these settings to physical activity.

Method: The authors identified peer-reviewed literature which presented a relationship between parks and recreation services (PRS) and physical activity. The search extracted 1,120 relevant articles; this was refined through the authors selecting only empirical studies that undertook quantitative research where physical activity was a dependent variable and specifically related to parks and recreation. This reduced the number of articles to 50 which the authors reviewed.

Conclusions:

- The future for examining parks and recreation as features of the built environment that enhance physical activity appears boundless. Until now, the tools and methods for studying parks and recreation within the built environment have been limited.
- Collaborations and partnerships have been lacking. Leisure scholars as well as all other related disciplinary scholars can contribute a variety of approaches and strategies to promote this line of study. For example, case studies could be helpful in examining the processes that occur in designing PRS and promoting their use for physical activity. Policy research relative to how parks and recreation is funded and how these settings and amenities fit into a broader community plan would be useful.
- The interesting aspect of this dilemma is that parks and recreation providers have been concerned with physical activity as one important dimension of their work for more than 100 years. However, as is true with most types of previous public health interventions, the focus has been on the individual and not on the park and recreation policies. These attempts to support and invest in parks and recreation will require public support and political advocacy as well as time, energy, money, and creativity. Physical activity as well as parks and recreation will need to become higher social priorities.
- Evidence-based research that shows an empirical relationship between the presence and characteristics of PRSs and the physical activity and health of community members is wide open for exploration. As is apparent from this literature analysis, efforts are underway.

Recommendations for Future Research:

- Transdisciplinary research which focuses on parks and recreational use that cuts across a number of fields as well as community-based research to improve public health is necessary.
- Longitudinal studies might be valuable in examining the use of recreational facilities over time.
- Emphasis on the participation and influence of non-academic researchers in the process of creating a knowledge base such as practitioners in parks and recreation have an important role to play in addressing the specifics of how built environments can promote physical activity.

- Greater inquiry into settings and amenities is needed such as the reciprocal relationships between leisure and health, including issues related to the design of areas and facilities, as well as the leadership, equipment, aesthetics, and participant developmental abilities.

HBEP Policy Implications for Practice:

- Support the provision of recreational open spaces for physical activity.
- Avoid standardising the development and management of open spaces.
- Ensure open space provisions are tailored to the locality.

Kahn, E. B., Ramsey, L. T., Brownson, R. C., Heath, G. W., Howze, E. H., Powell, K. E., Stone, E. J., Rajab, M. W., Corso, P., Briss, P. A. and Task Force Commun Prevent, S. (2002). 'The effectiveness of interventions to increase physical activity: A systematic review'. *American Journal of Preventive Medicine* 22(4): 73-108.

Key Words: Exercise; leisure activities; physical fitness; physical endurance; decision making; evidence-based medicine; economics; preventive health services; public health practice; meta-analysis; review literature.

Location: The authors are from the USA; the study focus is on the USA.

Aim: To evaluate the effectiveness of various approaches to increasing physical activity: informational, behavioural and social, and environmental and policy approaches.

Method: The Guide to Community Preventive Service's methods for systematic reviews was used and changes in physical activity behaviour and aerobic capacity were used to assess effectiveness.

Conclusions: Two informational interventions ('point-of-decision' prompts to encourage stair use and community-wide campaigns) were effective, as were three behavioural and social interventions (school-based physical education, social support in community settings, and individually-adapted health behaviour change) and one environmental and policy intervention (creation of or enhanced access to places for physical activity combined with informational outreach activities). Additional information about applicability, other effects, and barriers to implementation

are provided in the review for these interventions.

Recommendations for Future Research: No specific recommendations were provided, however, the review did conclude that evidence is insufficient to assess a number of interventions: classroom-based health education focused on information provision and family-based social support (because of inconsistent findings), and mass media campaigns and college-based health education and physical education (because of an insufficient number of studies).

HBEP Policy Implications for Practice:

- Provide access to parks, walking trails and recreational facilities.
- Incorporate point-of-decision prompts in stairwells.
- Promote community engagement with the planning process.

Kestens, Y. and Daniel, M. (2010). 'Social inequalities in food exposure around schools in an urban area'. *American Journal of Preventive Medicine* 39(1): 33-40.

Key Words: Dietary energy density; pedestrian walking speeds; Body-Mass Index; physical-activity; neighbourhood deprivation; retail environment; obesity; access, restaurants; overweight.

Location: The authors are from Canada; the study focus is on Montreal, Canada.

Aim: To evaluate the relationships between food sources around schools, neighbourhood income, and commercial density.

Method: A Geographic Information System (GIS) was used to derive measures of exposure to fast-food outlets, fruit and vegetable stores, and full-service restaurants near primary and secondary schools in Montreal, Canada, in 2005. Food source availability was analysed in 2009 in relation to neighbourhood income for the area around schools, accounting for commercial density.

Conclusions:

- Schools in the lowest income areas had the highest concentration of fast-food outlets within a 750 metre radius.
- Food source exposure around schools is inversely associated with neighbourhood income, but commercial density partly accounts for this association.

- Having food retailer options within one to five kilometres of the home had a negative association with obesity.
- School environments or routes to and from school offer strategic target areas for intervention.

Recommendations for Future Research:

- Further research is necessary to document food consumption among youth attending schools in relation to nearby food source opportunities.
- To understand the link between dietary intake and spatial food accessibility, while accounting for social and economic dimensions of food consumption.

HBEP Policy Implications for Practice:

- Regulate land use around schools to limit student access to fast-food.



Kingsley, J., Townsend, M. and Henderson-Wilson, C. (2009). 'Cultivating health and wellbeing: members' perceptions of the health benefits of a Port Melbourne community garden'. *Leisure Studies* 28(2): 207-219.

Key Words: Health; wellbeing; urban and community garden.

Location: The authors are from Australia; the study focus on Melbourne, Australia.

Aim: To report on a research project undertaken with members of a community garden in Port Melbourne, Australia, to investigate the ways in which such a facility contributes to the enhancement of health, wellbeing and contact with nature for urban dwellers.

Method: Ten members from an urban community garden were interviewed using qualitative semi-structured questions exploring perceptions of health and wellbeing benefits associated with membership.

Conclusions:

- Many members saw the garden as a supportive and an easy place to discuss issues going on in their lives, with spirituality featured in the way members described their gardening experience.
- Gardening allows for a greater connection with and enjoyment of their community; enabling people to achieve goals they did not think they were capable of.
- Working in the gardens improved their

physical fitness and overall health through consuming the produce from their gardens.

- That community gardens have individual health and wellbeing benefits, not least through offering an escape from daily stresses and a social outlet in our urban environment.

Recommendations for Future Research:

- To explore the membership profile of a range of Australian community gardens to identify the potential for capitalising to a greater degree on the community cohesion possibilities.
- To study the effects of community gardens on different socio-economic groups, cultures and age groups.

HBEP Policy Implications for Practice:

- Support the provision of neighbourhood community gardens.

Kirk, S. F. L., Penney, T. L. and McHugh, T. L. F. (2010). 'Characterizing the obesogenic environment: The state of the evidence with directions for future research'. *Obesity Reviews* 11(2): 109-117.

Key Words: ANGELO framework; obesogenic environment; policy; scoping review.

Location: The authors are from Canada; the literature reviewed is mostly from the USA and Australia.

Aim: This is a scoping review to discuss a cohesive definition of framework for characterisation of an 'obesogenic' environment. Currently the characteristics of an obesogenic environment are defined differently depending on the context of the research. This study aims to discuss how these characteristics can be standardised as well as to characterise primary relevant studies and highlight gaps in the literature and directions for future research.

Method: One hundred and forty six primary studies were identified for the review with inclusion based on examination of the influence of an environmental characteristic on some measure of Body Mass Index (BMI), diet or physical activity. Intervention studies were excluded. These 146 studies were then characterised using a matrix developed by Swinburn et al. 1999 called the 'Analysis Grid for Environments Linked to Obesity' (ANGELO)

to determined 'themes' of research. ANGELO dissects the environment according to size (micro or macro) and type (physical, economic, political and socio-cultural), for measures related to obesity. Various research area themes were then identified.

Conclusions: The environment may play a critical role in obesity development, prevention and management, however, it is impossible to consider every possible environmental contribution to energy balance. Obesogenic environments are therefore very difficult to define or characterise and we have yet to determine the best method for measuring the impact of the environment accurately or consistently.

Recommendations for Future Research: Fundamental research on measurement and theorisation of the elements of the environment that facilitate or encourage obesity is relatively under developed. An appropriate theory to encompass this complex and dynamic system is required.

HBEP Policy Implications for Practice:

- Support interdisciplinary collaboration to develop accepted standards of evidence and ways to analyse existing evidence to justify policy change.

References:

Swinburn B., Egger G. and Raza F. (1999). 'Dissecting obesogenic environments: The development and application of a framework for identifying and prioritizing environmental interventions for obesity'. *Preventive Medicine* 29(6): 563-570.

[Lavin, T., Higgins, C., Metcalfe, O. and Jordan, A.\(2006\). *Health impacts of the built environment: A review.* Institute of Public Health, Dublin, Ireland.](#)

Key Words: Built environment; health; buildings; public spaces and networks.

Location: The authors are from Ireland and study was funded by the Irish government; the review focuses on research from around the world.

Aim: This review is the third in a series (other reviews were on the health impacts of transport and employment) and it illustrates how the built environment impacts on health. The review aims to highlight the unequal distribution of these impacts on different sections of the population. It is aimed at a wide audience and is not intended to be a

systematic review of all the available evidence but rather a summary document.

Method: This is not a systematic review of the literature, but a generalised discussion across very broad areas of 'Buildings' (Air quality, Temperature, Humidity, Noise, Light, Safety, Space, Accessibility, Immediate surroundings, Locality, Housing improvements) and 'Public Spaces and Networks' (Physical activity, Air quality, Social networks, Safety, Attractiveness, Accessibility).

Conclusions: The review puts forward a range of broad conclusions.

- Children and the elderly are identified as vulnerable population groups.
- Moving forward requires recognition that health and planning disciplines and policy makers need to work together and that a robust policy framework is required.

Recommendations for Future Research: No recommendations were reported.

HBEP Policy Implications for Practice:

- Support interdisciplinary collaboration to develop locally specific policy change.
- Develop inclusive policies for vulnerable groups such as children, the elderly and people with disabilities.

[Leck, E. \(2006\). 'The impact of urban form on travel behavior: A meta-analysis'. *Berkeley Planning Journal* 19: 37-58.](#)

Key Words: Built environment; urban form; travel behaviour; meta-analysis; density; land use.

Location: The author is from the Israel Institute of Technology, however, the review is of papers only published in the USA.

Aim: To estimate the overall impact of built environment characteristics on travel behaviour. This is an empirical (meta) analysis to assess the impact of urban form on travel behaviour following Crane's (1996) recommendation to organise data through characterisation and measures of urban form (street layout, composite measures of density, mixed use, etc.).

Method: The article follows on from two previous meta analysis of data related to healthy built environments/transportation (Ewing and Cervero 2001 and Ewing 2005). 'Meta-analysis is a package of statistical

procedures designed to accumulate and integrate experimental results across independent studies that address a related set of research questions' (Leck 2006, p. 42). Five urban form variables (residential density, employment density, land use mix, sidewalk ratio, and grid percentage) and seven travel variables (vehicle miles travelled, vehicle hours travelled, vehicle trips, non-work vehicle trips, probability of commuting by automobile, transit, or by walking) were included in the meta-analysis. Seventeen different primary studies were included in the analysis. Studies were included in the meta-analysis if they were published in the last fifteen years in the United States and assessed any of the three characteristics of the built environment.

Conclusions:

- The article presents a comprehensive critique/explanation on the pros and cons the meta analysis methodology.
- The influence of mixed land use on travel was found to be overwhelmingly significant.
- Residential density is the most important built environment element which influences travel choices. Residential densities were found to be negatively correlated with vehicle miles travelled/ vehicle kilometres travelled, vehicle hours travelled, total vehicle trips, and with the probability of commuting to work by automobile. The density element was also found to be statistically significant and positively correlated with the probability of commuting to work by transit, or by walking and cycling. Employment density was found to exert a strong influence on travel behaviour.
- The linkage between street pattern and travel behaviour was not found to be significant.

Recommendations for Future Research:

- Future studies should combine the methods used by Ewing and Cervero (2001) meta-analysis and this study to be able to predict elasticities between travel behaviour and built environment variables. The former study is good in that it is able to measure elasticities, however, this study has been able to incorporate more travel variables. This recommendation was followed in Ewing and Cervero's 2010 meta-analysis.
- A normalised index for the density, diversity and design attributes used to measure the built environment should be constructed to narrow discrepancies caused by the different methodologies and quantification methods used in the various primary studies.

HBEP Policy Implications for Practice:

- Promote mixed land uses.
- Consider cautious increases in density of employment and residential uses. The future amenity of residents in the design of increased densities is of paramount importance to this recommendation.

References:

- Crane, R. (1996). 'Cars and drivers in the new suburbs: Linking access to travel in neotraditional planning'. *Journal of the American Planning Association* 62(1):51-65.
- Ewing, R. (2005). 'Can the physical environment determine physical activity levels?'. *Exercise and Sport Sciences Reviews* 33(2): 69-75.
- Ewing, R. and Cervero, R. (2001). 'Travel and the built environment: A synthesis'. *Transportation Research Record* 1780: 87-113.
- Ewing, R. and Cervero, R. (2010). 'Travel and the built environment: A meta analysis'. *Journal of the American Planning Association* 76(3): 265-294.

Mead, E., Dodson, J. and Ellway, C. (2006). *Urban environments and health: Identifying key relationships and policy imperatives*. Research Monograph 10. Urban Research Program, Griffith University, Brisbane, Australia.

Key Words: Urban environment; health; urban form; transport; health services; planning policy.

Location: The authors are from Griffith University, Brisbane, Australia; however, the papers examined are from the USA, Europe, UK, Canada and Australia.

Aim: '...to map out issues and areas that are well understood and to identify those parts that are poorly comprehended' (Mead et al. 2006, p. 6). This is a Research Monograph to investigate the general relationships between urban environments and health. The project examines the empirical evidence for relationships between urban environments and health outcomes, focusing on three specific aspects of the urban environment: urban form, transport systems and the location of health services. The research was a collaborative project of Griffith University's Urban Research Program and Queensland Health.

Method: The parameters for the review included a focus on causes of increased morbidity and mortality from chronic diseases. The review does not include the impact of



toxins or substances on health, such as vehicle emissions or other forms of pollution – ‘such factors have been well-covered by the health literature and the processes of causality are well appreciated’ (Mead et al. 2006, p. 14).

Conclusions: While research projects have examined particular health impacts of urban form, no single study has assessed the complete spectrum of health impacts that are conceivably influenced by urban factors. In fact, ‘the very enormity of such a task makes it doubtful it could be undertaken successfully’ (Mead et al. 2006, p. 14).

The main finding of the study is that the evidentiary base for many expected relationships between urban form, transport systems, health services location and eventual health outcomes is underdeveloped. While some associations between urban environments and behavioural outcomes have been identified, there is insufficient evidence to identify specific causal relationships. This finding indicates that a much greater research effort is required into both health and urbanity to identify urban-health relationships.

There is a relatively undeveloped research base that demonstrates connections between urban built form and health outcomes. While some associations have been found between urban form and individual behaviour (such as greater levels of physical activity), social health outcomes remain uncertain. Some statistical associations have been identified at the metropolitan scale, but at the local level there is insufficient research to support strong conclusions about the relationship between urban form and health. This insufficiency, in part due to the low number of studies that have been conducted, is also a consequence of the weak conceptual and methodological frame of such studies.

Compared to urban form, the impact of transport systems on urban health outcomes has received little attention. Those studies that have been completed tend to focus on pedestrian travel, typically in relation to land-use destinations and route quality. The study claims that links between public transport and public health are very hard to find in the research literature. ‘There is, in sum, an urgent need to study the relationship between transport systems and health outcomes’ (Mead et al. 2006, p. 1).

Recommendations for Future Research:

- *Expansion of Urban Health Research:* There is a need to improve the evidence base for perceived or assumed urban health relationships. The study states that the current literature lacks coherent conceptual and methodological

frameworks. There is also a dearth of research studies available to support assumed relationships; while inter-jurisdictional research, too, is very limited. Researchers, policy makers and governments need to expand the quantity and quality of research into the relationship between urban environments and health outcomes.

- *Collaboration Between Urban and Health Researchers:* The overall lack of an extensive and coherent research base and the divide that has emerged between health and planning researchers and professionals during the 20th Century needs urgent redress. It is essential that health and urban researchers engage intensively and extensively to build the research and evidence base for urban health investigations.

HBEP Policy Implications for Practice:

- Support interdisciplinary collaboration to develop accepted standards of evidence and ways to analyse existing evidence to justify policy change.

Mehta, V. (2007). ‘Lively streets: Determining environmental characteristics to support social behavior’. *Journal of Planning Education and Research* 27(2): 165-187.

Key Words: Environment behaviour and perceptions; streets as social space; design of neighbourhood commercial streets.

Location: The author is from the USA; the study focus is on Boston, USA.

Aim: Through an empirical examination this article seeks to understand the behavioural responses of people to the environmental quality of neighbourhood commercial streets.

Method: Structured and semi-structured observations are used to study stationary, lingering, and social activities on three neighbourhood commercial streets in Boston, Massachusetts. Eleven land use and physical characteristics of buildings and the street are identified based on the literature review and extensive observations. These are measured and tested to understand which characteristics support stationary, lingering, and social activities.

Conclusions:

- The findings of this study clearly indicate that a physically well-designed street for

people, with generous sidewalks, ample seating and other street furniture, tree cover and other landscape elements, articulated street façades of buildings built to the sidewalk, and so on, becomes much more useful and meaningful for people when there are community gathering places and a variety of activity-supporting stores and other land uses at the street, and vice versa.

- The two comparative examples of street configurations drastically differ in their Liveliness Indices though very similar in their physical characteristics. The difference in the businesses affects the perception and significance of the street for the users at these two locations and in ways that certain physical characteristics are manifest and utilised. The first building is a coffee shop and is recognized as a community gathering place for a variety of people in the neighbourhood, as it provides seating to use the sidewalk as a place to relax, interact, and socialise. The second is a bank and provides no such opportunities, and as a result, the same area of sidewalk and the benches are seldom used. The differences in these two very similar physical conditions at the same neighbourhood commercial street further illustrate how the engagement between the behavioural patterns and patterns of the physical environment is important to support stationary and social activities on the street.

Recommendations for Future Research: No recommendations were articulated in the references.

HBEP Policy Implications for Practice:

- Promote community spaces in residential areas.
- Promote mixed land uses that provide destinations for incidental social interactions.



Mehta, N. K. and Chang, V. W. (2008). 'Weight status and restaurant availability: A multilevel analysis'. *American Journal of Preventive Medicine* 34(2): 127-133.

Key Words: Fast-food access; weight status; obesity; healthful eating environment.

Location: The authors are from Philadelphia, USA; the study focus is on the USA.

Aim: To assess how the local food environment, particularly access to fast-food and restaurants, impacts on the weight status of residents.

Method: This study analysed the relationship between the restaurant environment and weight status across counties in the United States. Individual data from the 2002–2006 Behavioural Risk Factor Surveillance System (BRFSS) were linked with restaurant data from the 2002 US Economic Census. Fast-food and full service restaurant density, along with restaurant mix (the ratio of fast-food to full-service restaurants), were assessed.

Conclusions:

- The mix of restaurants to fast-food outlets had an association with weight status, with the availability of fast-food relative to other away-from-home choices increasing the likelihood of unhealthy weight outcomes.
- Areas with a high density of full service restaurants were indicative of a more healthful eating environment, suggesting a need for research into the comparative healthfulness of foods served at different types of restaurants.
- Future prospective studies are required to delineate causal pathways. This study found that the restaurant environment was independently associated with weight status, including individual-level demographic and behavioural characteristics and county-level structural factors.
- While a higher mix of fast-food to full service restaurants may contribute to an obesogenic environment, the availability of full service restaurants may also contribute to a more healthful eating environment.

Recommendations for Future Research:

- Future research delineating the causal processes associated with restaurant availability and weight status could benefit from combining individual and contextual longitudinal data to model the change in weight status and the change in restaurant density over time and to

treat underlying eating and weight status preferences as unmeasured fixed-effect characteristics that cancel out of the regression equation.

- Future studies should consider the restaurant mix as a pathway through which more general area level factors can affect weight status differences. Future studies should also consider how actual eating behaviours are shaped by the availability of different types of restaurants.

HBEP Policy Implications for Practice:

- **Employ land use regulation to ensure equitable access to healthy fresh food.**

Ogilvie, D., Foster, C. E., Rothnie, H., Cavill, N., Hamilton, V., Fitzsimons, C. F. and Mutrie, N. (2007). 'Interventions to promote walking: Systematic review'. *British Medical Journal* 334(7605): 1204-1207.

Key Words: Walking; interventions; physical activity; systematic review.

Location: The authors are from the UK; the study reviews literature from around the world.

Aim: To assess the effects of interventions to promote walking in individuals and populations.

Method: Published and unpublished reports in any language were identified by searching 25 electronic databases, by searching websites, reference lists, and existing systematic reviews, and by contacting experts. Studies needed to be controlled before and after studies of the effects of any type of intervention on how much people walk, the distribution of effects on walking between social groups, and any associated effects on overall physical activity, fitness, risk factors for disease, health, and wellbeing. The systematic review included 19 randomised controlled trials and 29 non-randomised controlled studies.

Conclusions: Interventions tailored to people's needs, targeted at the most sedentary or at those most motivated to change, and delivered either at the level of the individual (brief advice, supported use of pedometers, telecommunications) or household (individualised marketing) or through groups, can encourage people to walk more, although the sustainability, generalisability, and clinical benefits of many of these approaches are uncertain. Evidence for the effectiveness of

interventions applied to workplaces, schools, communities, or areas typically depends on isolated studies or subgroup analysis.

Recommendations for Future Research:

Interventions need to be better evaluated, particularly large scale community level interventions, both planned health promotion activities and natural experiments involving major changes to the built environment (also called for in Foster and Hillsdon 2004, Petticrew et al. 2005, Ogilvie et al. 2006). Future intervention studies should include the capacity to investigate whether increases in walking are sufficiently frequent, intense, or sustained to produce measurable improvements in anthropometric, physiological, biochemical, or clinical outcomes, or alternatively whether increases in walking might be counterbalanced or outweighed by decreases in other forms of physical activity or an increase in injuries.

HBEP Policy Implications for Practice:

- **Support walking groups.**
- **Target behaviour change programs at those who need to change, as well as those who want to change.**

References:

Foster, C. and Hillsdon, M. (2004). 'Changing the environment to promote health enhancing physical activity'. *Journal of Sports Science* 22(8): 755-769.

Ogilvie, D., Mitchell, R., Mutrie, N., Petticrew, M. and Platt S. (2006). 'Evaluating health effects of transport interventions: Methodologic case study'. *American Journal of Preventive Medicine* 31(2): 118-126.

Petticrew, M., Cummins, S., Ferrell, C., Findlay, A., Higgins, C. and Hoy C. (2005). 'Natural experiments: An underused tool for public health?'. *Public Health* 119(9): 751-757.

Owen, N., Humpel, N., Leslie, E., Bauman, A. and Sallis, J. F. (2004). 'Understanding environmental influences on walking: Review and research agenda'. *American Journal of Preventive Medicine* 27(1): 67-76.

Key Words: Walking; physical activity; public health; environmental attribute.

Location: The authors are from Australia and the USA; the research reviewed is from around the world.

Aim: To review studies from the public health research literature specifically addressing the



environmental correlates of walking.

Method: Eighteen quantitative studies examining environmental attributes related to the walking behaviour of adults were identified from a previous literature review (Humpel et al. 2002) from database searches including PsycInfo, Cinahl, Medline. Studies were included if they used any type of walking as the main outcome variable and if the independent variables included environmental attributes, whether measured objectively or by self-report. Associations with environmental attributes were examined separately for exercise and recreational walking, walking to get to and from places, and total walking. Studies on relationships of objectively assessed and perceived environmental attributes with walking were included.

Conclusions: Aesthetic attributes, convenience of facilities for walking (sidewalks, trails); accessibility of destinations (stores, park, beach); and perceptions about traffic and busy roads were found to be associated with walking for particular purposes. Attributes associated with walking for exercise were different from those associated with walking to get to and from places.

Recommendations for Future Research: While few studies have examined specific environment-walking relationships, early evidence is promising. Key elements of the research agenda are developing reliable and valid measures of environmental attributes and walking behaviours, determining whether environment-behaviour relationships are causal, and developing theoretical models that account for environmental influences and their interactions with other determinants.

HBEP Policy Implications for Practice:

- Promote traffic safety programs.
- Provide facilities for walking such as well maintained footpaths and walking trails.
- Provide clusters of useful walkable destinations.

References:

Humpel, N., Owen, N. and Leslie, E. (2002). 'Environmental factors associated with adults' participation in physical activity: A review'. *American Journal of Preventive Medicine* 22(3): 188-199.

Pearce, J., Blakely, T., Witten, K. and Bartie, P. (2007). 'Neighborhood deprivation and access to fast-food retailing: A national study'. *American Journal of Preventive Medicine* 32(5): 375-382.

Key Words: Fast-food; socio-economic conditions; neighbourhood deprivation; geographic access.

Location: The authors are from various New Zealand universities; the study focus is on New Zealand.

Aim: The objective of this study was to determine whether geographic access to fast-food outlets varied by neighbourhood deprivation and school socioeconomic ranking, and whether any such associations differed to those for access to healthier food outlets.

Method: Data were collected on the location of fast-food outlets, supermarkets, and convenience stores across New Zealand. The data were geocoded and Geographic Information Systems (GIS) was used to calculate travel distances from each census mesh block (i.e., neighbourhood), and each school, to the closest fast-food outlet. The median travel distances are reported by a census-based index of socio-economic deprivation for each neighbourhood, and by a Ministry of Education measure of socio-economic circumstances for each school. The analyses were repeated for outlets selling healthy food to allow comparisons.

Conclusions:

- There is a strong association between neighbourhood deprivation and geographic access to fast-food outlets in New Zealand. This may contribute to the understanding of environmental causes of obesity.
- These results are consistent with international evidence highlighting that fast-food restaurants tend to be more prevalent in more-deprived neighbourhoods.
- Outlets potentially selling healthy food (e.g., supermarkets) are patterned by deprivation in a similar way. These findings highlight the importance of considering all aspects of the food environment (healthy and unhealthy) when developing environmental strategies to address the obesity epidemic.

Recommendations for Future Research:

Further research could usefully examine the relationship between neighbourhood access to fast-food outlets, fast-food consumption,

and obesity in schoolchildren and general population samples. Future studies should also simultaneously examine all aspects of the food environment (healthy and unhealthy) in order to disentangle the various contextual drivers of dietary intake.

HBEP Policy Implications for Practice:

- Incorporate zoning restrictions on fast-food outlets into primary planning instruments.
- Regulate the marketing, advertising and promotion of fast-food products.

Pearce, J., Hiscock, R., Blakely, T. and Witten, K. (2008). 'The contextual effects of neighbourhood access to supermarkets and convenience stores on individual fruit and vegetable consumption'. *Journal of Epidemiology and Community Health* 62(3): 198-201.

Key Words: Neighbourhood access; fruit and vegetable consumption, supermarkets; diet.

Location: The authors are from various New Zealand universities; the study focus is on New Zealand.

Aim: To examine the association between neighbourhood accessibility to supermarkets and convenience stores and individuals' consumption of fruit and vegetables in New Zealand.

Method: Using geographical information systems, travel times from the population-weighted centroid of each neighbourhood to the closest supermarket and convenience store were calculated for 38,350 neighbourhoods. These neighbourhood measures of accessibility were appended to the 2002-2003 New Zealand Health Survey of 12,529 adults.

Conclusions: There is little evidence that poor locational access to food retail provision is associated with lower fruit and vegetable consumption.

Recommendations for Future Research: Further research incorporating direct and precise measurements of fruit and vegetable access is required.

HBEP Policy Implications for Practice:

- There are no conclusive policy implications from this research.

Poortinga, W., Dunstan, F. D. and Fone, D. L. (2007). 'Perceptions of the neighbourhood environment and self rated health: A multilevel analysis of the Caerphilly Health and Social Needs Study'. *BMC Public Health* 7: 285.

Key Words: Neighbourhood environment; health; self rating; social cohesion; social capital.

Location: The authors are from the Cardiff University, Wales; the study focus is on the UK.

Aim: To examine the importance of different social and physical aspects of the neighbourhood environment for people's self rated health.

Method: The authors utilised population survey data from the Caerphilly Health and Social Needs Study collected in 2001. The responses of people under 75 years of age (n = 10,892; a response rate of 62.3 percent) were used. All individual responses were geo-referenced to the 325 census enumeration districts of Caerphilly County Borough (Council) in south-east Wales.

Conclusions:

- Unemployment significantly increased the odds of men reporting poor health, but did not do so for women.
- The result that neighbourhood deprivation is detrimental to people's health, even when taking into account individual socio-economic status, is consistent with other studies on the impact of the socio-economic environment on public health.
- Social cohesion was inversely related to the reporting of poor health, confirming that the social organisation of the local community plays an important role in public health.
- The gender-stratified analyses show that a lack of social cohesion significantly increases the odds of women reporting poor health, but not the odds of men reporting poor health.
- Men are more influenced by their work environment and tend to report more support at the workplace than women.

Recommendations for Future Research: Exploring the suggestion that men and women benefit differently from the neighbourhood environment requires further research into how gender differences are affected by the impact of neighbourhood health.

HBEP Policy Implications for Practice:

- Promote physical activity interventions in both the workplace and the residential environment.
- Promote policies to enhance community capacity, including organised community events and programs, such as community gardens, mothers groups and walking groups.

Pretty, J., Peacock, J., Hine, R., Sellens, M., South, N. and Griffin, M. (2007). 'Green exercise in the UK countryside: Effects on health and psychological well-being, and implications for policy and planning'. *Journal of Environmental Planning and Management* 50(2): 211-231.



Key Words: Green exercise; natural environment; green space; health; psychological wellbeing; planning policy.

Location: The authors are from the University of Essex in the UK; the study focus is on the UK.

Aim: To measure the effects of ten green exercise case studies (including walking, cycling, horse riding, fishing, canal boating and conservation activities) in four regions of the UK. The authors hypothesised that 'green exercise' will improve health and psychological wellbeing.

Method: Ten green exercise case studies were selected from across the various types of green exercise initiatives (i.e., geographical, issue, habitat, activity and group based initiatives), and throughout the UK (two in Scotland, two in Wales, two in Northern Ireland and four in England). Participants were reached using a stratified cluster sampling technique and data was obtained through a composite questionnaire consisting of two sections. The first contained questions to determine the respondent's general physical and psychological health at the time of sampling and, the second, questions to determine their self-esteem and mood. Section Two of the questionnaire was completed before and after participation in the green exercise initiative, in order to identify any resulting changes to psychological health.

Conclusions:

- Self-esteem improved as a result of participation in green exercise. The study found that there was a statistically

significant improvement in self-esteem scores pre- and post-activity.

- Participation in green exercise was shown to elicit positive benefits on mood states. Exercise reduced anger-hostility, confusion-bewilderment, depression-dejection and tension-anxiety. However, there was an increase in fatigue-inertia.
- Overall, participation in green exercise was shown to decrease Total Mood Disturbance (TMD), which provides an indication of a person's emotional state.
- Due to the fact that TMD scores did not vary significantly between the ten case studies, the authors argued, 'the key conclusion is that all these 10 green exercise activities, regardless of their type or level of intensity, yield mental health benefits, despite varying duration and intensity' (Pretty et al. 2007, p. 222).
- In relation to physical health, all the activities represented in the ten case studies provided positive contributions. The most intensive energy expenditure resulted from mountain biking, closely followed by horse riding. Interestingly, self-esteem was shown to increase slightly as energy expenditure increased.

Recommendations for Future Research:

This study could be expanded to include a habitually inactive group. Further research is also needed to identify the barriers to participation in green exercise and the economic benefits associated with this type of exercise.

HBEP Policy Implications for Practice:

- Support participation in green exercise by improving access to green open space and promoting the physical and psychological benefits of green exercise.
- To increase opportunities for green exercise, establish partnerships with recreational providers, the sports and leisure industry, agricultural managers, schools, social and mental health professionals, environmental managers, planners and the health sector.

Prezza, M. and Pacilli, M. G. (2007). 'Current fear of crime, sense of community, and loneliness in Italian adolescents: The role of autonomous mobility and play during childhood'. *Journal of Community Psychology* 35(2): 151-170.

Key Words: Fear; crime; community; loneliness; youth.

Location: The authors are from the University of Rome, Italy; the study focus is on Italy.

Aim: To examine the role of autonomous mobility and play in public and semi-public places in childhood to predict adolescents' sense of community, fear of crime, and, through the mediation of these two last psychosocial factors, feelings of loneliness.

Method:

- The participants included 789 Italian students (mean age 16).
- The instruments used were the Italian Sense of Community Scale, the Neighborhood Relations Scale, and the UCLA Loneliness Scale.
- A questionnaire was administered to investigate the adolescents' current fear of crime and their autonomous mobility when they were children by asking them to recall their play habits and independent mobility at eight to ten years of age.

Conclusions:

- More frequent play in public places and greater autonomy in mobility and in play in childhood predict less fear of crime, whereas becoming autonomous at an older age predicts greater fear of crime.
- More autonomy and play in public areas during childhood influences more intense neighbourhood relations, a stronger sense of community, and less fear of crime and, in turn, these latter variables consequently reduce feelings of loneliness during adolescence.
- If a form of territoriality, appropriation, and personalization of space is established in childhood through mobility and autonomous play in public and semi-public places, a good 'antidote' is created for fear of crime in adolescence.
- Public places are the theatre for significant childhood events and can provide a base for constructing an affective link with the territory. In adolescence, this link may evolve into what is defined as a sense of community.

- The relationship between neighbourhood characteristics and children's autonomy and development outcomes is strongly linked and consequently play in public spaces should be encouraged without the use of strict supervision.

Recommendations for Future Research:

No recommendations were articulated in the reference.

HBEP Policy Implications for Practice:

- Include children in the development and management of places for play.

Pucher, J., Dill, J. and Handy, S. (2010). 'Infrastructure, programs, and policies to increase bicycling: An international review'. *Preventive Medicine* 50(Supplement 1): S106-S125.

Key Words: Bicycling; active travel; active transport; health; intervention; policy; infrastructure; sustainable transportation.

Location: The authors are from the USA; the studies reviewed are from Europe, the USA, Australia, Canada and Columbia.

Aim: To assess research on the effects of various interventions to encourage cycling, including infrastructure, public transport integration, education and marketing as well as comprehensive packages.

Method: The article reviews 139 peer and non-peer reviewed research papers as well as analysis of secondary data from 14 case study cities. To identify research to review, the authors developed a list of direct interventions that were hypothesised to encourage cycling and looked for studies measuring the effects of these interventions. Database searches were used, along with contact with practitioners, website searches. To be included in the study, reviews had to be written in English, published after 1990 and contain some kind of quantitative component.

Conclusions: Interventions to encourage cycling will be most effective when they are part of a comprehensive effort. This can be achieved through careful planning and policy integration across transport, housing and land use sectors and with public consultation – particularly from cyclists. 'Health' is posited as a major draw card to garner the public and political support necessary to implement a truly comprehensive package of policies.

Recommendations for Future Research:

Implementing authorities need to undertake

before and after studies to evaluate interventions. Standardised instruments to measure cycling uptake (such as household survey instruments and protocols for cycling counts) need to be developed.

HBEP Policy Implications for Practice:

- Pursue a range of interventions to encourage cycling, including infrastructural provision, educational programs and workplace support.
- Include the public in the development of cycling infrastructure that may be controversial.

Radbone, I. and Hamnett, S. (2003). *Land use, walking and cycling: A review of recent research, Australian policies and suggestions for further work.* Proceedings of the 26th Australasian Transport Research Forum, New Zealand Institute of Highway Technology, New Plymouth, New Zealand.



Key Words: Built environment; Land use, walking, cycling; active transport; transport infrastructure; urban form; public health; physical activity; sustainable travel.

Location: The author is based in Australia; the review has a very Australian 'policy relevant' focus, however, it reviews research from around the world.

Aim: To examine empirical studies on ways in which urban form affects public health, specifically through the ways in which the built environment encourages or discourages physical activity and the use of more sustainable modes of travel.

Method: The authors undertook a general, not systematic review of the selected literature.

Conclusions:

- *The Impact of Density in Encouraging Sustainable Travel*

Areas of agreement: Higher densities lead to shorter distances between origins and destinations; aggregate walking and cycling levels increase with density; modal share of trips by walking and cycling rises with increased density.

Issues: Density is less significant than socio-economic factors in influencing travel behaviour; density may often be a proxy for other urban form variables.

- *The Impact of Mixed Use in Encouraging Sustainable Travel*

Areas of agreement: Mix of use, like higher density, can lead to shorter distances between origins and destinations; shorter local shopping and entertainment trips may replace longer trips to regional centres; aggregate walking and cycling levels increase with increasing mix of uses; modal share of trips by walking and cycling rises with mixed use.

Issues: Limited number of studies of the impact of mixed use in employment centres, as distinct from neighbourhoods; mixed use developments may provide local facilities, but people still need to choose to use them; living close to work has become less relevant because of the changing nature of employment and the diminishing importance of work-related trips as a proportion of all trips.

- *The Impact of Micro-design Issues in Encouraging Sustainable Travel*

Areas of agreement: Grid street patterns create higher levels of connectivity and decrease distances between origins and destinations; empirical studies have found higher modal shares for walking and cycling in areas designed around grids; a wide range of detailed design features – shelter, safe storage facilities, detailed attention to street and footpath surfaces increase people's propensity to use more sustainable modes of travel; micro-design is important in creating environments supportive of physical activity.

Issues: Several studies of the impact of grid layouts on mode share are inconclusive; few rigorous studies of the effects of street design on travel behaviour; regional accessibility issues may be more influential on travel decisions than local street network characteristics.

- *Other Conclusions*

Location of grid-based suburbs is likely to be significant – grid-based suburbs at the urban fringe may have less evidence of sustainable modes of travel than suburbs with similar features in inner urban areas. Pedestrian and bike amenities tend to be co-located with other urban form elements, such as higher densities and grid street patterns. Once again, it is difficult to separate out causes and effects.

The intuitive notion that higher density may encourage less car use is being replaced by the notion that density,

mixed use and micro-design elements in some combination are most likely to influence people's willingness to use more sustainable modes of travel. Increasing levels of density alone will not serve to promote more walking without increased mixing of uses which brings services and other destinations closer to where people live and work. Areas that are dense and mixed often exist without the required linkages between uses. While increased proximity can be achieved through higher levels of density and mix, the ability to efficiently move between activities requires an interconnected street network that is supported at the micro scale through site design.

Recommendations for Future Research:

- There is a lack of understanding of how to isolate the effects of urban form on transport and physical activity from other factors.
- Available data on travel behaviour and urban form is biased towards motorised transport and is not generally sufficient to test the impact of micro-design elements on travel behaviour.
- Too often walking and cycling are combined in any statistical analysis.
- Overseas research, particularly in the United States, has set an agenda, however the technology available with Geographical Information Systems (GIS) needs to be used to test this agenda in local conditions.
- Information on the effects of interventions by governments and developers needs to be collected and analysed appropriately.

HBEP Policy Implications for Practice:

- Combine carefully planned higher densities with mixed uses.
- Promote grid like streets.

Renalds, A., Smith, T. H. and Hale, P. J. (2010). 'A systematic review of built environment and health'. *Family and Community Health* 33(1): 68-78.

Key Words: Built environment; health; land use; social capital; walkability.

Location: The authors are from the USA; the research reviewed is from around the world.

Aim: 'To review and summarise the literature on the built environment as it pertains to health' (Renalds et al. 2010, p. 69).

Method: The 'integrative systematic review' focuses on published research articles indexed in the CINAHL and MEDLINE databases. The search criteria included research articles written in English, peer-reviewed and published between January 2003 and January 2009. The search term was 'built environment' located in the article's title. Only 64 articles were initially identified, 41 of these were considered editorial or review articles and only 23 articles were included in the review. The audience for the review is obviously very general.

Conclusions: The selected articles were reviewed with some basic conclusions drawn under the headings of:

- Built environment and physical activity (e.g., there are statistically significant associations between (1) increased walkability and residential density (Clark and George 2005, Nagel et al. 2008) (2) increased walkability and smaller size of neighbourhood blocks (Wood et al. 2008) and (3) increased walkability and close proximity to retail stores for elderly residents (Berke et al. 2007)).
- Built environment and social capital (e.g. built environment characteristics such as land use mix and walkability may increase social cohesion related to increased familiarity with neighbours (Leyden 2003)).
- Built environment and obesity (e.g. residents living in neighbourhoods that promoted physical activity, through being more pedestrian-friendly or through greater access to physical activity facilities, had a lower Body Mass Index (BMI) (Rundle et al. 2007, Heinrich et al. 2008, Li et al. 2008)).
- Built environment and mental health (e.g., the presence of a higher degree of social capital among neighbours (i.e. a greater degree of community investment, connection, and feelings of safety) fosters a greater sense of well-being and thus perceptions of better mental health (Araya et al. 2006)).

Recommendations for Future Research: Many of the studies used a cross-sectional research design, making it difficult to infer causation. There is a need for longitudinally designed studies to further assess impact. In addition, most studies were conducted in an urban setting – it is not known what findings would result in a rural setting. Longitudinal studies and studies conducted in a rural setting are needed.

HBEP Policy Implications for Practice:

- Consider cautious increases in density of employment and residential uses. The future amenity of residents in the design of increased densities is of paramount importance to this recommendation.

References:

- Araya, R., Dunstan, F., Playle, R., Thomas, H., Palmer, S. and Lewis, G. (2006). 'Perceptions of social capital and the built environment and mental health'. *Social Science and Medicine* 62(12): 3072-3083.
- Berke, E. M., Koepsell, T. D., Moudon, A. V., Hoskins, R. E. and Larson, E. B. (2007). 'Association of the built environment with physical activity and obesity in older persons'. *American Journal of Public Health* 97(3): 486-492.
- Clarke, P. and George, L. K. (2005). 'Understanding and addressing the challenges of disability: The role of the built environment in the disablement process'. *American Journal of Public Health* 95(11): 1933-1939.
- Heinrich, K. M., Lee, R. E., Regan, G. R., Reese-Smith, J.Y., Howard, H.H., Haddock, C.K., Poston, W.S. and Ahluwalia, J.S. (2008). 'How does the built environment relate to body mass index and obesity prevalence among public housing residents?'. *American Journal of Health Promotion* 22(3): 187-194.
- Leyden, K. M. (2003). 'Social capital and the built environment: The importance of walkable neighborhoods'. *American Journal of Public Health* 93(9): 1546-1551.
- Li, F., Harmer, P. A., Cardinal, B. J., Bosworth, M., Acock, A., Johnson-Shelton, D. and Moore, J. M. (2008). 'Built environment, adiposity, and physical activity in adults aged 50-75'. *American Journal of Preventive Medicine* 35(1): 38-46.
- Nagel, C.L., Carlson, N. E., Bosworth, M. and Michael, Y. L. (2008) 'The relation between neighborhood built environment and walking activity among older adults'. *American Journal of Epidemiology* 168(4): 461-468.
- Rundle, A., Roux, A. V. D., Freeman, L. M., Miller, D., Neckerman, K. M. and Weiss, C. C. (2007). 'The urban built environment and obesity in New York City: A multilevel analysis'. *American Journal of Health Promotion*. 21(4): 326-334.

Wood, L., Shannon, T., Bulsara, M., Pikora, T., McCormack, G. and Giles-Corti, B. (2008). 'The anatomy of the safe and social suburb: an exploratory study of the built environment, social capital and residents' perceptions of safety'. *Health Place* 14(1): 15-31.

Saelens, B. E. and Handy, S. L. (2008). 'Built environment correlates of walking: a review'. *Medicine and Science in Sports and Exercise* 40(7 Suppl): S550 - S566.

Key Words: Walking; built environment; physical activity; urban design.

Location: The authors are from USA; the studies reviewed are mostly from the USA and Australia.

Aim: To review evidence published in existing studies on the built environment correlates with walking.

Method: The authors sourced nine 'reviews of reviews', three articles discussing research in general and a Transport Research Board (TRB) publication. To this, the authors added 29 original studies sourced from database searches (criteria for inclusion were: must have one measure of the built environment, must have one measure of walking or walking and cycling as a distinct form of physical activity and must be in English).

Conclusions: The article presents a detailed review of key research on the built environment and walking up to and including 2006.

- There are consistent associations found between walking for transportation purposes and density, land use mix, and proximity of non-residential destinations.
- Recent evidence less consistently found a relation between transportation walking and pedestrian infrastructure, such as sidewalk presence and condition, although pedestrian infrastructure was more consistently related to recreation walking.
- There has been methodological progress such as the greater use of more objective measures of physical or built environment when examining correlates of walking. One advancement has been to increase focus on the micro level through objective measurement of the built environment around an individual's residence rather than at larger scales (such as census tract) (see for example Lee et al. 2006a and 2006b). Other advancements include the greater diversity in environmental factors studied from the street level to the neighbourhood level and even regional



level, more specificity in measurement for environmental factors and walking, the inclusion of more age-diverse samples and examination of demographic variables as moderators (e.g. gender).

- The evidence regarding children is primarily restricted to factors related to walking to school, for which proximity, density, and the quality of the pedestrian infrastructure and traffic safety appear to play roles.
- The issue on which researchers have made the least progress in examining relations between environment and walking is causality. Despite this, the identification of environmental correlates of walking through cross-sectional studies offers guidance to increase opportunities for walking.
- There is a need to evaluate and analyse demographic and other potential confounding variables at both the individual and larger environment level.
- Cross-sectional studies of the built environment and walking have been most loudly criticised on the issue of self-selection, observed associations between the built environment and walking are potentially explained by the prior self-selection of residents into a built environment that is consistent with their predispositions toward walking. The limited evidence on self-selection suggests that it does occur but that the built environment influences walking even after accounting for self selection (see for example Handy et al. 2006).
- It is possible that an increase in transportation walking resulting from a change to the built environment substitutes for other forms of physical activity without increasing overall physical activity, but empirical evidence regarding this potential substitution is generally lacking.
- Limitations to the review include that some of the original reviews were not necessarily comprehensive and that there are too many variables and measures in each review to make a meta analysis of the evidence possible.
- 'Evidence points to latent demand for walking suggesting an opportunity to increase walking through improved environments; needed improvements include increased land use intensity and mix along with investments in walking infrastructure; and planners should focus efforts on enablers and constraints on walking (Lee et al. 2004). The review

of prior reviews and recent empirical evidence regarding built environment factors and walking support such recommendations' (Saelens and Handy 2008, p. S564).

Recommendations for Future Research: More prospective, longitudinal studies are needed if causality is to be proved however the evidence on correlates appears sufficient to support policy changes.

HBEP Policy Implications for Practice:

- Promote mixed land uses that provide clusters of useful walkable destinations.
- Promote grid like streets.
- Consider cautious increases in density of employment and residential uses. The future amenity of residents in the design of increased densities is of paramount importance to this recommendation.

References:

- Handy, S., Cao, X. and Mokhtarian, P. L. (2006) 'Self-selection in the relationship between the built environment and walking'. *Journal of the American Planning Association* 72(1): 55-74.
- Lee, C. and Moudon, A.V. (2004). 'Physical activity and environment research in the health field: Implications for urban and transportation planning practice and research.' *Journal of Planning Literature* 19(2): 147-181.
- Lee, C. and Moudon, A.V. (2006a). 'The 3Ds + R: Quantifying land use and urban form correlates of walking'. *Transportation Research Part D* 11(3): 204-215.
- Lee, C. and Moudon, A.V. (2006b). 'Correlates of walking for transportation or recreation purposes'. *Journal of Physical Activity and Health* 3(1 Suppl): S77-98.

Sallis, J. F. and Glanz, K. (2009). 'Physical activity and food environments: Solutions to the obesity epidemic'. *Milbank Quarterly* 87(1): 123-154.

Key Words: Built environment; policy; nutrition; health behaviour; ecological models.

Location: The authors are from the USA; the study focus is on the USA.

Aim: This article is a status report on research on physical activity and food environments, and it suggests how these findings can be used to improve diet and physical activity and to control or reduce obesity.



Method: This article summarises and synthesises recent reviews and provides examples of representative studies. It also describes ongoing innovative interventions and policy change efforts that were identified through conference presentations, media coverage, and websites.

Conclusions:

- Environment, policy, and multilevel strategies for improving diet, physical activity, and obesity control are recommended based on a rapidly growing body of research and the collective wisdom of leading expert organisations.
- A public health imperative to identify and implement solutions to the obesity epidemic warrants the use of the most promising strategies while continuing to build the evidence base.
- Policies with beneficial effects for both obesity and climate change need to be evaluated, and opportunities for collaboration with the environmental protection movement should be considered.
- Teaching school age students about their food and physical activity environments could produce a generation of advocates for healthy community environments.
- Strategies that engage the community, involve multiple stakeholders, and strengthen advocacy need to be developed, evaluated, and refined to implement the evidence-based policy changes expected to lead to non-obesogenic food and physical activity environments.

Recommendations for Future Research:

Research is required on how students can be educated to embrace healthy eating and physical activity and the way such education can create a generation of healthy environmental advocates. Community focused research which follows through assessment of the impacts of educating students is also required. This should be through observation of local areas with comparisons of results between neighbourhoods of contrasting socio-demographic characteristics.

HBEP Policy Implications for Practice:

- **Employ land use regulation to support the provision of local supermarkets and prevent clusters of fast-food outlets.**

Sallis, J. F., Bowles, H. R., Bauman, A., Ainsworth, B. E., Bull, F. C., Craig, C. L., Sjostrom, M., De Bourdeaudhuij, I., Lefevre, J., Matsudo, V., Matsudo, S., Macfarlane, D. J., Gomez, L. F., Inoue, S., Murase, N., Volbekiene, V., McLean, G., Carr, H., Heggebo, L. K., Tomten, H. and Bergman, P. (2009). 'Neighborhood environments and physical activity among adults in 11 countries'. *American Journal of Preventive Medicine* 36(6): 484-490.

Key Words: Neighbourhood; built environment; physical activity; adults; international.

Location: The lead author is from the USA with others from around the world; the study focus is worldwide.

Aim: To assess and compare the impacts of neighbourhood environments on physical activity throughout 11 countries.

Method: Data for an International Physical Activity Prevalence Study was collected alongside Environmental surveys from 11 countries: Belgium, Brazil, Canada, Colombia, China (Hong Kong), Japan, Lithuania, Norway, New Zealand, Sweden, and the US. The sample was required to be representative of national populations or a significant region(s) within a country (defined as a population of <1,000,000), with an age range of 18-65 years. Households were typically selected at random, and individuals within households were selected either randomly or by most recent birthday. The data collected measured perceptions of the neighbourhood environment and physical activity measures.

Conclusions:

- A variety of neighbourhood attributes relevant to physical activity for both the transportation and recreation domains were associated with meeting health-enhancing guidelines.
- Changes to the built environment may be effective in increasing physical activity, but multiple environmental changes are likely needed to have a substantial effect.
- The majority of participants in all countries except Brazil reported having free or low-cost recreation facilities and sidewalks on most streets in their neighbourhoods. European countries had the highest access to bicycling facilities.
- The US had the most limited access to transit stops and was the only country in which less than 60 percent of participants were within walking distance of shops which helps to explain the small

percentage of trips made by walking and bicycling in the US.

- The multiple significant individual variables suggest that a variety of environmental interventions may affect physical activity, with different environmental variables having particular relevance for physical activity such as for transportation versus recreation.
- Highly supportive environments were associated with a 100 percent higher likelihood of sufficient physical activity and with a 70 percent higher likelihood of meeting guidelines after adjusting for education.

Recommendations for Future Research: No recommendations were articulated in the reference.

HBEP Policy Implications for Practice:

- Pursue a social ecological approach in order to encourage physical activity by including modifications to the built environment with other policy innovations such as educational programs.

Schaefer-McDaniel, N., O'Brien Caughy, M., O'Campo, P. and Gearey, W. (2010). 'Examining methodological details of neighbourhood observations and the relationship to health: A literature review'. *Social Science and Medicine* 70(2): 277-292.

Key Words: Review; systematic social observations (SSO); methods; neighbourhood observation.

Location: The authors are from Canada; the literature reviewed is from the USA; Canada; London, UK; and Perth, Australia.

Aim: In recent years, neighbourhood observations have become a popular alternative method for characterising neighbourhood environments. Rooted in sociology of crime research, observations are conducted by trained observers who use a checklist to observe and rate neighbourhoods on a number of conditions such as physical (e.g. traffic volume, housing conditions) and social (e.g. presence of people, gang activity) attributes. While this methodology has been gaining momentum in recent years, notably absent from the literature is a review to examine this methodology in detail. The

purpose of the present study was to examine research that has used neighbourhood observations as a method.

Method: Fifty-one English language studies from 1990 onwards were identified from an original list of over 1000 abstracts. Specific criteria were that the study must contain a neighbourhood observation as part of its method. These 51 studies were then analysed paying particular attention to the areas of (1) methodological rigor (i.e. how observations are carried out in the field and how data are analysed), (2) geographical boundaries (i.e. how neighbourhoods and areas of observation are spatially defined), and (3) the relationship between neighbourhood observations and residents' health (i.e. how studies examine and analyse the link between observed neighbourhood attributes and health).

Conclusions: The use of neighbourhood observations as a method in assessing the built environment in a health context has been given very little attention. There is widespread variability in the way observations are conducted and analysed making comparative studies impossible.

Recommendations for Future Research: The nature of observational research does not lend itself to standardisation. The study does not recommend standardisation of observational measures of neighbourhood factors however it does encourage researchers to assess existing literature and be explicit about any adaptation of existing methods so that comparisons might be made. The study also recommends further research into observational research as a method, such as training for raters and tool development. Finally, the study recommends more dialogue on the definition of 'neighbourhood' and the best methods to pursue to ensure the neighbourhood unit selected for the study is relevant rather than convenient.

HBEP Policy Implications for Practice:

- Support interdisciplinary collaboration to explore less traditional methods of data collection.

Semenza, J. C. and Krishnasamy, P. V. (2007). 'Design of a health-promoting neighborhood intervention'. *Health Promotion Practice* 8(3): 243-256.

Key Words: Neighbourhood intervention; built environment; social capital; social networks, community empowerment and participation.

Location: The authors are from the USA; the study focus is on the USA.

Aim: To assess how community intervention through integration of public spaces into a grid-plan city can improve social capital, and to promote community participation and neighbourhood stewardship in the interest of public health.

Method: The method involved the assessment and analysis of a community intervention to improve the public domain through the utilisation of both social and built form commodities. This involved a structured intervention entitled 'Intersection Repair' devised in Portland, Oregon, by a non-profit organisation, to implement urban gathering places in the public right of way. Specific steps included situation analysis, community outreach, asset mapping, design workshops, construction permitting, building workshops, and process evaluation.

Conclusions:

- Design and implementation of health-promoting community interventions can advance public health and community wellbeing; however, realisation of such programs is often challenging. Even more challenging is the implementation of ecologic interventions to revitalise built urban environments.
- The community created human-scale urban landscapes with interactive art installations to encourage social interactions. Such aesthetic improvements, which included painted street murals, information kiosks, hanging gardens, water fountains, benches, and so on, were intended to strengthen social networks and social capital by providing places for residents to engage in conversation.
- Community engagement in neighbourhood design benefits the public at multiple levels, by promoting a healthier lifestyle, over and above urban landscape improvements.
- Community initiated health-promoting interventions build social relationships, empower neighbourhood residents, and enable them to collectively solve local problems in collaboration with various

stakeholders within and outside the community.

- For these projects to be successfully implemented, and institutionalised, they should be tailored to address the needs and norms of the individual neighbourhoods.
- Analysis of the characteristics and needs of individual neighbourhoods is fundamental for the design and successfully implement a health-promoting neighbourhood intervention that is specifically tailored for a neighbourhood.
- When applied in different settings these interventions can increase physical activity and social interactions and may help to reverse chronic diseases including obesity, diabetes, and depression.

Recommendations for Future Research: No recommendations were articulated in the reference.

HBEP Policy Implications for Practice:

- Involve the community in the design of projects such as public art installations.
- Tailor community interventions to local contexts and needs.

Shoup, L. and Ewing, R. (2010). *The Economic Benefits of Open Space, Recreation Facilities and Walkable Community Design*. Robert Wood Johnston Foundation, Princeton, USA.

Key Words: Economic; open space; recreation facilities; walkable community design; physical activity; open space.

Location: The authors are from the USA; the literature reviewed is mostly from the USA.

Aim: To review peer-reviewed and independent reports on the economic value of outdoor recreation facilities, open spaces and walkable community design with a focus on 'private' benefits that accrue to nearby homeowners and to other users of open space.

Method: The authors review 50 relevant studies and give details of a further 36 relevant studies.

Conclusions:

- Open spaces such as parks and recreation areas can have a positive effect on nearby residential property values and can lead to proportionately higher property tax revenues for local



governments (provided municipalities are not subject to caps on tax levies).

- Open space in urban areas will increase the level of economic benefits to surrounding property owners more than open space in rural areas.
- The economic impact parks and recreational areas have on home prices depends on how far the home is from the open space, the size of the open space and the characteristics of the surrounding neighbourhood.
- Compact, walkable developments can provide economic benefits to real estate developers through higher home sale prices, enhanced marketability and faster sales or leases than conventional development.
- Open space, recreation areas and compact developments may provide fiscal benefits to municipal governments.

Recommendations for Future Research:

- More detailed evidence on the actual type of park, landscape elements and locations preferred will better inform local government and policy makers.
- Ecological services, greenhouse gas reduction and mental health benefits should also be factored in as indirect benefits of parks.

HBEP Policy Implications for Practice:

- Use proven market demand for open spaces, recreational facilities and traditional neighbourhood design to justify policy change.

Story, M., Giles-Corti, B., Yaroch, A. L., Cummins, S., Frank, L. D., Huang, T. T. and Lewis, L. B. (2009). 'Work group IV: Future directions for measures of the food and physical activity environments'. *American Journal of Preventive Medicine* 36(4 Suppl): S182-S188.

Key Words: Food environment; physical activity environment; research; policy; diet; obesity.

Location: The authors are from the UK, USA, Australia and Canada; the research reviewed is from around the world.

Aim: The 2007 'Measures of the Food and Built Environments' workshop, sponsored by the National Institute for Health and the Robert Wood Johnson Foundation, included four work groups that deliberated on various aspects of the food and physical activity environments. This paper comes out of Work Group IV: a group convened to identify current evidence gaps and barriers in food and physical activity environments and policy research measures to date, and develop recommendations to guide future directions related to measurement and methodologic research efforts and policy measures.

Method: The workshop began with an individual visioning activity with participants thinking about the question: 'Where do we need to be by 2015 with regard to measuring the food and physical activity environments and related policies?' Ideas were then solicited in a group format and recorded on large poster paper by the facilitator. After the ideas were consolidated, participants voted to determine the priority areas for future directions. Group participants then discussed the barriers and challenges for each priority area and developed recommendations.

Conclusions: To further advance progress in environmental and policy research, six measurement and methodologic issues need to be addressed as summarised below.

Recommendations for Future Research:

- *Priority 1: 'Identify Relevant Factors in the Food and Physical Activity Environments to Measure, Including Those Most Amenable to Change' (i.e. WHAT are the relevant factors?).*

Recommendations:

- Social-ecologic and multilevel approaches (e.g. social, physical, economic, and policy contexts) are well suited for understanding food and physical activity environments and developing interventions and policies. These approaches should be used in

future research.

- New theories and conceptual models should be developed, and/or existing theories or models expanded or refined to help identify and assess relevant factors and their amenability to change.
- Transdisciplinary research approaches should be strengthened and expanded (a number of mechanisms to do this are listed in the paper).
- **Priority 2: 'Improve the Understanding of Mechanisms for Relationships Between the Environment, Physical Activity, Diet, and Obesity' (i.e. HOW can the relevant factors be manipulated?).**

Recommendations:

- Work groups should be developed to conceptualise and develop theoretical frameworks that capture environments in greater depth and that hypothesize potential pathways and mediating effects on food and physical activity environments.
- Mechanistic studies are needed that involve mixed methodology (e.g. qualitative and quantitative approaches), interventions related to changes in the environment, secondary analysis of existing observational and intervention data; and development and application of new methodologies for the analysis and design of multilevel studies.
- Research frameworks should be developed to form effective community partnerships (e.g., academic-community) in order to help render mechanistic studies more feasible, valid, and meaningful.
- **Priority 3: 'Develop Simplified Measures That Are Sensitive to Change, Valid for Different Population Groups and Settings, and Responsive to Changing Trends' (i.e. HOW can changes be measured?).**

Recommendations:

- A common core of measures should be developed and disseminated. Funding for this type of research should be made available through grants or exploratory research grant mechanisms that provide enough support and resources for high quality research.
- An electronic repository of field-tested, reliable, and validated measurement tools should be developed with full supporting documentation that can be freely accessed online.

- Federal, state, and local sources of policy, environmental, and geographic data on the food and physical activity environments should be collected after a consistent protocol is developed, adopted, and made freely available.
- **Priority 4: 'Evaluate Natural Experiments to Improve the Understanding of Food and Physical Activity Environments and the Impact on Behaviours and Weight' (How can opportunities for natural experiments be better utilised?).**

Recommendations:

- Funding bodies should develop rapid review mechanisms to facilitate timely funding of evaluations of natural experiments.
- Public and private sector agencies should identify, in collaboration with researchers, appropriate natural experiments for evaluation and best-practice models of evaluation.
- Procedures and processes should be developed to train a cadre of researchers in the evaluation of the impact of environmental interventions and policies on obesity-related behaviours. For example, this could occur through continuing education or professional development efforts as well as formal coursework in graduate school programs.
- **Priority 5: 'Establish Surveillance Systems to Predict and Track Change over Time'.**
'Currently, few consistently adopted standards exist for data collection or for measuring food and physical activity environments. Similarly, few protocols have been established to monitor how environments change over time' (Story et al. 2009, p. S186).

Recommendations:

- Strong advocates for a surveillance system to predict and track change should be cultivated at different levels – grassroots and higher – who can champion and encourage such a system.
- Any surveillance system should start with what we already know (proof of concept, from around the world) and should be flexible enough so new information can be added.
- Localities should be identified and supported to serve as pilot sites for developing a surveillance system.
- Performance monitoring systems



should become tools to monitor compliance between proposed growth and development activities and health outcomes.

- Cross-pollination of expertise in health and planning departments should be encouraged.

- *Priority 6: 'Develop Standards for Adopting Effective Health-Promoting Changes to the Food and Physical Activity Environments'.*

Recommendations:

- A better understanding is needed of environmental and policy change thresholds to be achieved in order to bring about behavioural change.
- Quality standards should be developed for the collection of geographic and environmental data and measures and survey tools.
- Funders should support a series of projects that undertake pooled analyses of existing studies with common measures or meta-analyses of published data.
- A review and evaluation of existing standards should be conducted to assess their impact on health outcomes, including any unintended consequences.
- Existing standards producing negative health or health behaviour outcomes should be modified and a periodic review commissioned.

HBEP Policy Implications for Practice:

- Support interdisciplinary collaboration to develop accepted standards of evidence and ways to analyse existing evidence to justify policy change.

Sugiyama, T., Leslie, E., Giles-Corti, B. and Owen, N. (2008). 'Associations of neighbourhood greenness with physical and mental health: do walking, social coherence and local social interaction explain the relationships?'. *Journal of Epidemiology and Community Health* 62(5): e9.

Key Words: Green environment; physical and mental health; walking; recreation; social.

Location: The authors are from Australia; the study was conducted in the city of Adelaide, South Australia.

Aim:

- To test whether perceived neighbourhood greenness is associated with perceived physical and mental health; and
- To test whether walking (both utilitarian and recreational) and social factors (social coherence and local social interaction) might explain the association between perceived neighbourhood greenness and physical and mental health.

Method: The study employed a spatially based sampling method and involved households selected from 32 neighbourhoods in the city of Adelaide, South Australia. In each of the 32 neighbourhoods, 250 addresses were randomly selected and mailed a letter requesting the participation of one individual from the household. Before an individual could undertake the study survey, they had to meet an eligibility criteria, which included the following attributes: 'living in a private dwelling, aged between 20 and 65 years, able to walk without assistance and be able to take part in surveys in English' (Sugiyama et al. 2008, p. 2). Survey question covered issues associated health status, perception of neighbourhood greenness and neighbourhood social characteristics. A total of 2,194 questionnaires were returned.

Conclusions: Perceived neighbourhood greenness enhances perceived physical and mental health, but to different degrees. It was found that there is a stronger association between mental health and neighbourhood greenness than with physical health. In greener environments, it was identified that people are more likely to participate in walking for recreational purposes. Consequently, walking explained the association between neighbourhood greenness and physical health.

Recommendations for Future Research: Longitudinal studies are needed to further examine the casual relationship between natural environments and health. In particular, such studies would focus on the effects of environmental interventions, such as the expansion of open/green space.

HBEP Policy Implications for Practice:

- Promote the provision of natural open spaces.

Sustainable Development Commission (UK) (2008). *Health, place and nature: How outdoor environments influence health and well-being: A knowledge base.* Unpublished review.

Key Words: Health; outdoor environment; natural spaces; air pollution; traffic; noise; flood; climate; accessibility; safety; land use; street design.

Location: The review has a UK focus but looks at articles from around the world.

Aim: This is a non-systematic general review to examine the contribution of aspects of the outdoor environment (both natural and built) to health in the context of promoting sustainable development.

Method: A 'snowball' method of literature review was conducted, which included looking at reference lists of key articles and consulting with key stakeholders. Peer-reviewed literature was given preference as were studies conducted since 2000. UK studies were sought, however, studies were included from around the world. The review is categorised as concentrating on one of the following specific aspects of the environment: natural spaces, air pollution, road traffic, noise, floods, climate, accessibility, safety and incivilities, mixed land-use and street design. The review breaks these aspects into 'direct effects' (flooding, noise, air pollution) and 'indirect effects' (street design, mixed use).

Conclusions: The article includes a set of very generic findings, with no systematic or new conclusions to that already present in the scholarly literature.

Recommendations for Future Research:

- The extent to which contact with nature can contribute to human health and well-being is considered by some to need further investigation (see Maller et al. 2005).
- The relationship between access to shops and services and mental health is unclear (see Clark et al. 2007).
- There is a lack of systematic research demonstrating evidence that the natural environment increases levels of social contact (see Health Council of the Netherlands and Dutch Advisory Council for Research on Spatial Planning, Nature and the Environment 2004).
- An interesting statistic: 'Between 1995 and 2000, Britain lost approximately one-fifth of its local services, including corner shops, post offices and banks' (New Economics Foundation 2002 cited

in Sustainable Development Commission 2008, p.14).

HBEP Policy Implications for Practice:

- There are no conclusive policy implications from this research.

References:

Clark, C., Myron, R., Stansfeld, S. A. and Candy, B. (2007) 'A systematic review of the evidence on the effect of the built and physical environment on mental health'. *Journal of Public Mental Health* 6(2), 14-27.

Health Council of the Netherlands and Dutch Advisory Council for Research on Spatial Planning, Nature and the Environment. (2004). *Nature and health: The influence of nature on social, psychological and physical well-being.* Health Council of the Netherlands and RMNO, The Hague, Denmark.

Maller, C., Townsend, M., Pryor, A., Brown, P. and St Leger, L. (2005). 'Healthy nature healthy people: 'Contact with nature' as an upstream health promotion intervention for populations'. *Health Promotion International*, 21(1), 45-54.

Thompson, S. M., Corkery, L. and Judd, B. (2007). 'The Role of Community Gardens in Sustaining Healthy Communities'. *Proceedings of the 3rd State of Australian Cities Conference, University of South Australia, Adelaide, Australia.*

Key Words: Community gardens; healthy communities; built environment; public health; public housing.

Location: The authors are from the University of New South Wales in Sydney, Australia; the study focus is on Sydney, Australia.

Aim: To study a community garden scheme operating in a public housing estate in Sydney's inner west and discuss the role of community gardens in building healthy and sustainable communities.

Method: A qualitative methodology was used for the study. This involved a literature review, data collection on the gardens, in-depth interviews with key stakeholders and five focus groups involving a total of 28 gardeners representing 50 percent of all gardeners. The focus groups explored five key themes: activity and therapeutic benefit, ownership and belonging, social function, managing the garden, cultural diversity and safety. The meetings were recorded and transcribed, and



the resulting transcripts analysed for recurring themes.

Conclusions:

- **Contribution to health and wellbeing:** The gardens were found to provide a setting for physical health benefits, through physical activity and access to fresh food and medicinal herbs, as well as psychological benefits, through relaxation, meditation, the maintenance of a daily routine, and spiritual connection.
- **Contribution to community and social life:** The gardens enabled social interaction and developed social capital within the community studied. The gardens were identified as a place to develop friendships, care for others and break down barriers. Some gardeners also believed that the presence of the gardens improved neighbourhood safety and security.
- **Contribution to cross-cultural relations:** The gardens also provided a link to many of the participants' traditional cultural practices. Specialised produce could be grown for cooking ethnic dishes and a sharing of produce often translated into a sharing of culture and knowledge.

Recommendations for Future Research:

More studies are needed to examine the social health benefits of community gardens, along with their role in areas subject to urban intensification.

HBEP Policy Implications for Practice:

- Support the development of community gardens, especially in areas with high residential densities and limited access to open space.
- Introduce regulations to protect unused land for community purposes such as gardening.

Tzoulas, K., Korpela, K., Venn, S., Yli-Pelkonen, V., Kaźmierczak, A., Niemela, J. and James, P. (2007). 'Promoting ecosystem and human health in urban areas using Green infrastructure: A literature review'. *Landscape and Urban Planning* 81(3): 167-178.

Key Words: Public health; human well-being; green Infrastructure; urban ecosystem; ecosystem health.

Location: The authors are from the UK and Finland; the research reviewed is from across the world but has a European focus.

Aim: To formulate a conceptual framework of associations between urban green space, and ecosystem and human health. To critically review the possible contributions of urban and peri-urban green space systems, on both ecosystem and human health.

Method: Relevant journals and texts were identified by the authors and searched using key words. A number of themes were then extrapolated from a critical evaluation of the articles identified. The review focused on studies that tested an association rather than causation.

Conclusions:

- An accumulating set of studies provide weak evidence on the positive relationship between wellbeing, health and green space.
- Evidence of the association between levels of physical activity and proximity of green areas in the neighbourhood have been provided in studies which have controlled for age, sex and education level.
- Ecosystem services provided by natural areas can provide healthy environments and physical and psychological health benefits to the people residing within them. Healthy environments can contribute to improved socio-economic benefits for those communities as well.

Recommendations for Future Research:

Considerable empirical research to explore the roles of environmental factors in public health is needed in order to resolve the following theoretical and methodological issues before policy interventions can be formulated:

- the identification, description and measurement of the environmental processes that affect health;
- the development and testing of hypotheses to explain how environmental factors influence health;

- the identification of causal relationships between environmental factors and health;
- testing of residual confounding variables;
- undertaking longitudinal studies and ensuring that geographical units (scale) are relevant to the health outcome under investigation; and
- the development of an ability to distinguish between the compositional, contextual and collective explanations for environmental effects on health.

There is a need to evaluate the potential economic implications of natural open spaces, linked to health effects and health service budgets.

Further research is required to establish different possible health responses to natural, semi-natural or artificial habitats.



HBEP Policy Implications for Practice:

- Promote the provision of natural open spaces.
- Support interdisciplinary collaboration to develop accepted standards of evidence and ways to analyse existing evidence to justify policy change.

van der Horst, K., Oenema, A., Ferreira, I., Wendel-Vos, W., Giskes, K., van Lenthe, F. and Brug, J. (2007). 'A systematic review of environmental correlates of obesity-related dietary behaviors in youth'. *Health Education Research* 22(2): 203-226.

Key Words: Obesity; dietary behaviour; youth; environmental factors.

Location: The authors are from the Netherlands; the studies reviewed are from around the world.

Aim: To address which environmental correlates have been studied in relation to child and adolescent energy, fat (total and energy percent), fruit, vegetable, snack, fast-food and soft drink intake. To identify environmental factors consistently associated with these obesity-related dietary behaviours.

Method: The authors sourced studies from a variety of databases written during a 24 year period (1980-2004). Their search criteria used 20 key terms including: energy intake, caloric intake, fat consumption, soft drink consumption. To be included in the research, studies needed to include the energy and fat intake, food or soft drink consumption of

healthy three to 18 year olds as dependent variables and an outcome measure that was assessed for at least one complete day. Only countries with established market economies, published in English in international peer reviewed journals were included. Intervention studies and studies that included only overweight/obese children were excluded. Studies were summarised with each environmental factor coded for association with dietary outcomes whether positive or negative.

Conclusions:

- There is consistent evidence for the relationship between parental intake and children's fat, fruit and vegetable intake, for parent and sibling intakes with adolescent's energy and fat intake and for parent educational level with adolescent's fruit and vegetable intake.
- Authors identified gaps in the available evidence of relationships between environmental factors and child and adolescent dietary intakes. Very few studies examined associations between micro-environmental factors in school and neighbourhood settings, and macro-environmental factors in city/ municipality settings.
- Finding that parental behaviour is associated with child and adolescent intakes implies that interventions should take the behaviour of parents into account.

Recommendations for Future Research:

Studies are required which focus on environmental levels and factors such as physical, socio-cultural, economic and political factors in the school, neighbourhood and city environment. These studies will create a broader understanding of the influence of environmental factors associated with obesity inducing behaviours in children and adolescents. Furthermore, factors such as availability and accessibility at home, school and neighbourhood should be studied in relation to energy, fat, soft drink, snacks and fast-food intake.

HBEP Policy Implications for Practice:

- Employ land use regulation to promote equitable access to healthy, fresh food.

Weaver, N., Williams, J. L., Weightman, A. L., Kitcher, H. N., Temple, J. M. F., Jones, P. and Palmer, S. (2002). 'Taking STOX: Developing a cross disciplinary methodology for systematic reviews of research on the built environment and the health of the public'. *Journal of Epidemiology and Community Health* 56(1): 48-55.

Key Words: Built environment; public health; systematic review; cross disciplinary research.

Location: The authors are from a multi-disciplinary team based at the University of Cardiff in Wales; the research reviewed is from around the world.

Aim: To develop a cross disciplinary literature search methodology for conducting systematic reviews of all types of research investigating aspects of the built environment and the health of the public.

Method: The authors trialled several database and key word search methods to explore the impact of searching in only medical, social science or built environment databases and came up with STOX – a way to classify research (Systematic Reviews, Trials, Observational Studies, Expressions of Opinion).

Conclusions: There is value in a broad-based approach to research on health and the built environment, including databases from a variety of disciplines in a comprehensive systematic review covering all types of research. Sole reliance on medical databases is likely to exclude a significant number of relevant research studies. 'Current relevant systematic reviews on public health and the built environment do not usually search built environment databases, and only half search beyond medical ones' (Weaver et al. 2002, p. 54).

Recommendations for Future Research:

While the majority of intervention studies may currently be retrieved by the medical and social science databases, a large number of observational studies are available in the built environment and grey literature. A broad-based approach, which considers a large range of evidence types, could be of value in a complex area like public health. Our methodology is designed to search for and classify all types of evidence via a cross disciplinary approach.

HBEP Policy Implications for Practice:

- Support interdisciplinary collaboration to develop accepted standards of evidence and ways to analyse existing evidence to justify policy change.

Wendel-Vos, W., Droomers, M., Kremers, S., Brug, J. and van Lenthe, F. (2007). 'Potential environmental determinants of physical activity in adults: A systematic review'. *Obesity Reviews* 8(5): 425-440.

Key Words: ANGELO framework; environment; physical activity; review.

Location: The authors are from the Netherlands; the article reviews research mainly from USA and Australia, but has a European interpretation of findings.

Aim: To gain insight into potential determinants of various types and intensities of physical activity among adult men and women.

Method: Studies were retrieved from Medline, PsycInfo, Embase and Social Scisearch. The ANGELO framework was used to classify environmental factors. In total, 47 publications were identified.

Conclusions: Supportive evidence was found for only very few presumed environmental determinants. Social support and having a companion for physical activity were found to be convincingly associated with different types of physical activity [(neighbourhood) walking, bicycling, vigorous physical activity/sports, active commuting, leisure-time physical activity in general, sedentary lifestyle, moderately intense physical activity and a combination of moderately intense and vigorous activity]. Availability of physical activity equipment was convincingly associated with vigorous physical activity/sports and connectivity of trails with active commuting. Other possible, but less consistent correlates of physical activity were availability, accessibility and convenience of recreational facilities. No evidence was found for differences between men and women.

Recommendations for Future Research: Most studies used cross-sectional designs and non-validated measures of environments and/or behaviour. Therefore, no strong conclusions can be drawn and more research of better quality is clearly needed. As a result of non-standard variables and measurement techniques, comparability between the included studies may be relatively low. Standardisation will enable a more systematic

review of evidence – ‘it is important to conduct future research with clear, possibly standardized definitions of environmental attributes and physical activity within the strongest study design possible’ (Wendel-Vos et al. 2007, p. 438).

HBEP Policy Implications for Practice:

- Promote policies that encourage locally based social networks such as organised community events, community gardens and mothers groups.
- Support interdisciplinary collaboration to develop accepted standards of evidence and ways to analyse existing evidence to justify policy change.



Winkler, E., Turrell, G. and Patterson, C. (2006). ‘Does living in a disadvantaged area mean fewer opportunities to purchase fresh fruit and vegetables in the area? Findings from the Brisbane food study’. *Health and Place* 12(3): 306-319.

Key Words: Health inequalities; area socio-economic disadvantage; access; retail outlets; fruits; vegetables; food, nutrition and diet; grocery shopping.

Location: The authors are from Brisbane, Australia; the study focus is on Brisbane, Australia.

Aim: To determine whether there are systematic differences in shopping infrastructure which are likely to influence the fruit and vegetable purchasing patterns of socio-economic groups in an Australian urban setting, and compare findings with international studies. Access to retail outlets is considered in terms of distance, the number of local shops, and their opening hours.

Method: The study was conducted in 2000 in the Brisbane City Statistical Subdivision (SSD). The study used census collection districts (CCDs), which contain an average of 200 households, are socio-economically homogeneous and cover varying spatial areas. A stratified random sample of 50 CCDs was selected from the 1,517 CCDs in the Brisbane SSD.

Shopping catchments were created to overcome the limitations of only addressing shops within administrative boundaries, and included shops ‘nearby’ to administrative boundaries. This covered a two and a half kilometre radius of the centroid of the sampled

CCDs to represent the area where residents of sampled CCDs were likely to shop. The authors used a previously developed eight category shop classification system based on shop size, primary activity and merchandise. The data was obtained through an audit of the shopping catchments conducted between July and October 2000.

Conclusions:

- The authors discovered null findings in terms of the number of shops and their opening hours in terms of the influence on access to shops and the purchasing of fruit and vegetables.
- Distances to shops should be measured as a relative distance as only measuring a straight line from the centre of the CCD to the nearest shop does not equate to the average distance a person must travel to reach fresh food.
- While it is unlikely that living in a socio-economically disadvantaged urban area (in Australia) means less opportunities to purchase fruits and vegetables; the individual socio-economic differences in diet are still influenced by environmental characteristics.
- Contrary to expectations, medium socio-economic areas had the most local supermarkets and greengrocers, yet the distance between supermarkets and green grocers was greater than that for disadvantaged CCDs.
- Access to a relatively equal shopping infrastructure assists in minimising socio-economic inequalities in diet.

Recommendations for Future Research: No recommendations were articulated in the reference.

HBEP Policy Implications for Practice:

- Employ land use regulation to promote equitable access to healthy, fresh food.

