

NICE
Programme Development Group
Preventing type 2 diabetes amongst adults in high risk groups

Environment & Physical Activity

Dr Steven Cummins
Healthy Environments Research Programme
Department of Geography
Queen Mary University of London

Email: s.c.j.cummins@qmul.ac.uk

September 14th 2010

This paper provides a short summary of the presentation on environment and physical activity delivered on 14/09/2010. The paper consists of a brief introduction followed by two sections. First, a section on the environmental correlates of physical activity and; second, a selective look at the evidence for the effect of environmental interventions on physical activity.

Introduction

The idea that the 'environment' matters for individual health is not new and has its roots in the holistic, Hippocratic tradition of medicine (Macintyre and Ellaway 2003; Meade and Earickson 2000). Since the early 1990s, there has been a considerable expansion of theoretical and empirical work investigating the role of neighbourhood environmental factors in the production and maintenance of health and health inequalities. The conceptual model which underpins this work is one of 'deprivation amplification' where vulnerable populations, usually located in deprived neighbourhoods, tend to have poorer access to health-promoting 'resources' and 'opportunities' and greater exposure to health-damaging environmental 'insults' compared to their wealthier counterparts (Macintyre 2007; Macintyre et al. 2002). Such an approach suggests that the spatial organisation of these environmental 'goods' and 'bads' is thought to exert an effect on health *independent* of personal characteristics such as age, sex, income and education and thus contributes to the production of an uneven geography of health inequality.

Environmental correlates of physical activity

In the context of physical activity, the environment can be considered in terms of characteristics of built urban form, such as access to amenities such as sports facilities, parks and green spaces as well as perceptions and attitudes towards the use of urban space. Such measures are used as proxies for the opportunities and barriers thought to restrict or enhance opportunities to be physically active. Studies of urban form have tended to focus on the idea of neighbourhood 'walkability' and 'connectivity'. It has been hypothesised that residents of more 'walkable' neighbourhoods tend to rely more on 'active' transport modes such as walking and cycling while residents of less 'walkable' and less 'well-connected' neighbourhoods have a greater reliance of motorised transport (Frank et al. 2007; Lopez-Zetina et al. 2006; Poortinga 2006). Access to green spaces, such as parks, or leisure centres have been considered as possible important predictors of physical activity among local users (Black and Macinko 2008; Burdette and Whitaker 2004). Walkable, connected and safe environments with good access to leisure amenities and open spaces are thus thought to encourage a more active lifestyle.

Urban sprawl, as one aspect of urban form that inhibits active travel, has also been investigated as a potential environmental risk factor. Studies have found that both adults and children who live in sprawling US counties are less likely to walk less during leisure time and also weigh more (Ewing et al. 2003, 2006). In a comparative study of suburban (sprawling) versus 'new urbanist' (compact) neighbourhoods those living in 'new urbanist' settings tend to have lower body weights than their suburban counterparts (Brown et al. 2008). A number of studies have also examined the relationship between access to parks and green spaces and physical activity. However, evidence

is mixed with three studies finding no relationship between access to natural or open spaces, having a park within a 5-min walk and exercise (Giles-Corti et al. 2005; Duncan and Mummery 2005; Wendel-Vos et al. 2004). Conversely, Li et al. (2005) found significant associations between the area of green and open space available locally, the number of reported neighbourhood recreational facilities and walking.

Overall, systematic reviews of primary observational studies have tended to find the best evidence for the following environmental risk factors (see Table 1 below).

Summary of Correlates	Total PA	Walking
Proximity to recreation facilities, convenience, walkable distance to facilities	++	+
Destination factors, micro-scale design, footpaths, trails	++	=
Route related factors: hilliness, traffic	+/0	+/0
Mixed land use, shops and services nearby	++	+
Walkability [specific mention]	+	+/0
Perceived safety	+/0	0
Lighting, streetlights	0	0
Area based: coastal residence	+	+
Urban/age of suburb	+	+
Culture, social environment as most important	+	+
Aesthetics [perceived]	++	+
High crime rates	0	0
Population density /sprawl	++	+
Unattended dogs	0	0
Connectivity	+	+

++ Significant in >5 reviews; + more often associated; +/0 equivocal; 0 no association

Abstracted from Baumann & Bull (2006)

Environmental interventions and physical activity

Previous NICE reviews for the Environment and Physical Activity PDG (2007) have found the best evidence for transport-related environmental interventions. These have tended to focus on the provision on structural interventions aimed at promoting active travel such as traffic calming, trail construction/refurbishment, road use restrictions and pricing, and the provision of cycling infrastructure. There is exceptionally limited (or no) evidence for interventions utilising other environmental approaches.

In recent years (since 2007) there have been a number of new primary studies which have chiefly been evaluations of natural experiments. For example MacDonald et al (2010) has examined the impact of light rail transit on active commuting (positive results) and Fitzhugh et al (2010) has investigated the improvement of urban greenways on recreational physical activity and active travel (somewhat positive). However studies such as these are often of varying quality and have mainly been undertaken in the USA.

Conclusion

The best evidence appears for transport related environmental risk factors and interventions. However the evidence base is relatively small, although growing fairly rapidly. However few studies are undertaken in the UK. Studies are often marred by poor exposure assessment in both experimental and observational research, and it is not always clear whether high-risk groups benefit from environmental programmes and policies. Evaluations of environmental programmes and policies in the UK are beginning to occur in the UK (eg iConnect, Cambridgeshire Guided Busway) however this evidence is not yet available.

References

- Bauman AE, Bull FC (2007) Environmental Correlates of Physical Activity And Walking in Adults and Children: A Review of Reviews. Loughborough: Loughborough University.
- Black, J. L., and Macinko, J. (2008). Neighborhoods and obesity. *Nutrition Reviews* 66, pp. 2–20.
- Burdette, H. L., and Whitaker, R. C. (2004). Neighborhood playgrounds, fast food restaurants, and crime: relationships to overweight in low-income preschool children. *Preventive Medicine* 38, pp. 57–63.
- Brown, A., Khattak, A., and Rodriguez, D. (2008). Neighbourhood types, travel and body mass: a study of 'New Urbanist' and 'Suburban' neighbourhoods in the USA. *Urban Studies* 45, pp. 963–988.
- Duncan, M., and Mummery, K. (2005). Psychosocial and environmental factors associated with physical activity among city dwellers in regional Queensland. *Preventive Medicine* 40, pp. 363–372.
- Ewing, R., Brownson, R. C., and Berrigan, D. (2006). Relationship between urban sprawl and weight of United States youth. *American Journal of Preventive Medicine* 31, pp. 464–474.
- Ewing, R., et al. (2003). Relationship between urban sprawl and physical activity, obesity, and morbidity. *American Journal of Health Promotion* 18, pp. 47–57.
- Fitzhugh EC, Bassett DR Jr, Evans MF. Urban trails and physical activity: a natural experiment. *Am J Prev Med.* 2010 Sep;39(3):259-62. Frank, L.D., Saelens, B.E., Powell, K.E., & Chapman, J.E. (2007).
- "Stepping toward causation: Do built environments or neighborhood and travel preferences explain physical activity, driving, and obesity?" *Social Science and Medicine*, 65. 1898-1914.
- Giles-Corti et al. (2005). Encouraging walking: how important is distance to, attractiveness, and size of public open space? *American Journal of Preventive Medicine* 28, pp. 169–176.
- Li, F., et al. (2005). Multilevel modelling of built environment characteristics related to neighbourhood walking activity in older adults. *Journal of Epidemiology and Community Health* 59, pp. 558–564.
- Lopez-Zetina J, Lee H, Friis R. The link between obesity and the built environment. Evidence from an ecological analysis of obesity and vehicle miles of travel in California. *Health Place.* 2006 Dec;12(4):656-64. Epub 2005 Oct 25.
- MacDonald, J.M., Stokes R.J., Cohen D.A., Kofner A, Ridgeway G.K. et al. (2010) The Effect of Light Rail Transit on Body Mass Index and Physical Activity 39(2) 105-112
- Macintyre, S., Ellaway, A., & Cummins, S. (2002). Place effects on health: How can we operationalise, conceptualise and measure them? *Social Science & Medicine*, 55, 125–139.
- Macintyre, S., & Ellaway, A. (2003). Neighbourhoods and health: An overview. In I. Kawachi, & L. Berkman (Eds.), *Neighbourhoods and health*. Oxford: Oxford University Press.
- Macintyre S. Deprivation amplification revisited; or, is it always true that poorer places have poorer access to resources for healthy diets and physical activity? *International Journal of Behavioral Nutrition and Physical Activity* 2007; 4:32.
- Meade, M., & Earickson, R. (2002). *Medical geography* (2nd ed.). New York: Guilford Press.
- Poortinga A. Perceptions of the environment, physical activity, and obesity. *Soc Sci Med.* 2006 Dec;63(11):2835-46. Epub 2006 Sep 6.
- Wendel-Vos, G., et al. (2004). Factors of the physical environment associated with walking and bicycling. *Medicine and Science in Sports and Exercise* 36, pp. 725–730.