Chapter 19

A Role for GPS Data in Qualitative Research: Exploring Links between Walking Behaviour, the Built Environment, and Crime Perception in South Africa

ABSTRACT

This chapter describes the use of GPS in a multi-method approach to explore environmental factors affecting walking patterns in South Africa. Quantitative measures of walking activity are derived from multiday GPS tracks of a sample of people in three case study areas in Pretoria, South Africa. The data suggests that a significant amount of walking takes place across a range of neighbourhood types. The authors then describe a methodology that marries the strengths of GPS data—notably its detail and its suitability for visualisation—with the benefits of more open-ended qualitative research methods to obtain richer insights into the motivations behind the observed behaviours, and the extent to which these are related to built environment factors. A key finding is that personal security and fear of crime is a critically important factor driving both the perceptions and behaviour of pedestrians, especially women. Specific adaptive behaviours are observed that warrant further research.

INTRODUCTION

The literature on travel behaviour and the built environment has grown rapidly over the past decade, driven by the need for a better understanding of how individual travel decisions are affected by characteristics of the spatial and street environment (Crane, 2000; Ewing & Cervero, 2001). Such an understanding is needed to help devise urban design interventions capable of supporting both active and sustainable transport options, under the rubric of new urbanist and transit-oriented development approaches (Rodriguez & Joo, 2004). A sub-strand of this effort focuses on the
behaviour of pedestrians, and the extent to which walking behaviour (e.g. walk trip frequencies or distances) is influenced by the characteristics and quality of the walking environment. Measures of the pedestrian environment are derived either from subjective indicators of users’ perceptions (e.g. Saelens et al., 2003; Smith, 2009), or from objective measures such as street connectivity and land use density (e.g. Cervero & Kockelman, 1997). For data on walking activity, researchers have mostly relied on recall surveys or activity diaries, sometimes supplemented by hand-drawn maps of walk routes. However, survey-based methods have limitations in terms of accuracy and detail – people often forget to report walk trips, especially if they are short; and it is very difficult to obtain detailed information on walk route choice and walk distances without risking respondent fatigue. This limits the usability of survey-based walk data for analysing the effects of micro-level environmental factors such as sidewalk quality and aesthetics. GPS technology is emerging as a promising tool for capturing detailed information on pedestrian movement, spurred by advances in the wearability and prolonged battery life of GPS devices. A few studies have attempted to link GPS-derived measures of walking activity with variables describing the built environment, demonstrating the advantages of GPS over traditional travel survey methods in terms of completeness, accuracy, and reduced respondent burden (Macket et al., 2007; Van der Spek et al., 2009).

This chapter describes the use of GPS in a multi-method approach to explore environmental and perceptual factors affecting walking patterns in South Africa. We extend the literature in two directions. Firstly, we focus on urban areas in Africa rather than developed countries where the bulk of walking activity research has been done to date. The role of walking, the conditions under which it takes place, as well as the perceptions and preferences of pedestrians to physical environment factors, differ in developing countries and warrant deeper study. Secondly, we embed GPS-based data collection within a multi-method approach. We firstly derive quantitative measures of walking activity from multiday GPS tracks of pedestrians. We then describe a methodology that combines the strengths of GPS data – notably its detail and its suitability for visualisation – with the benefits of more open-ended qualitative methods to obtain richer insights into the motivations behind the observed behaviours. We demonstrate the value of this combined approach for research exploring travel behaviours in new or uncertain contexts. The method is applied in three case studies in Pretoria, the capital of South Africa, including three different environments in terms of land-use and inhabitants. The GPS-derived quantitative measures of walking activity show that considerable amounts of walking take place in these neighbourhoods, and that noticeable differences exist between the walking patterns of men and women in the sample. The qualitative component indicates one of the major reasons for these differences to be perceptions and fear of crime. In fact, security appears to be one of the main factors driving decisions about walking behaviour in South African cities, more so than in developed countries. We also describe a range of adaptive behaviours, showing how pedestrians adapt their routing in order to reduce exposure to crime.

The chapter first provides a brief overview of previous research on travel behaviour and the built environment, and of applications of GPS technologies in this field. We then describe the multi-method approach developed for this study, and its application in three case studies. Lastly follows conclusions and recommendations for further research.

TRAVEL BEHAVIOUR AND THE BUILT ENVIRONMENT

The relationship between travel behaviour and the built environment has recently been a prolific area of research. A growing component of this literature has focused specifically on walking as