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Assessing the impact of the National Cycle Network and physical activity lifestyle on cycling behaviour in England

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ABSTRACT

This paper examines the association between access to National Cycle Network (NCN) routes in England and an individual's cycling behaviour whilst accounting for their broader physical activity lifestyle and controlling for their socio-economic circumstances. It identifies a positive association between access to these routes and the total minutes of any form of cycling, and the number of days that cycling takes place primarily for recreational purposes. The broader physical activity of individuals also has a positive association with cycling. Walking appears most likely to be complementary to non-recreational cycling, whilst participation in sport with all forms of cycling, but not with longer duration utilitarian trips. The research also indicates that access to NCN routes has the potential to increase such cycling further, with the exception of longer utilitarian trips, as does a more physically active lifestyle, particularly walking. The main policy implications of the research are to recognise that cycling is intrinsically linked to other physical activity, notably, walking, but that the NCN routes measured in this study primarily support longer duration recreational activity, which is also affected by sporting activity. This suggests that one avenue for achieving the health benefits of cycling may be through promoting NCN routes to harness a more generally active lifestyle and particularly in leisure, whilst sustainability may be further promoted through being linked more to other active travel such as walking. There is a therefore a need to exploit the potential of such NCN route provision as part of this promotion.

1. Introduction

Active travel through cycling is generally seen to be an important way of both reducing congestion and also contributing to a healthier and fitter population (Department for Transport, 2012). This has led to recent UK government support of £148 m to improve infrastructure in 8 major cities (The Guardian, 2013). Nonetheless, significant investment in cycle routes has already taken place in the UK, notably through the efforts of active transport charity, Sustrans, which began in Bristol in the UK in 1977. Up until the 1990s Sustrans focussed on developing and improving transport conditions for walking and cycling with route development in specific localities. Beginning in 1995 and underpinned by National Lottery funding, Sustrans has since developed the National Cycle Network (NCN) to try to link both new and existing traffic free paths to quiet

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and traffic-calmed roads. The NCN currently stretches to 14,500 miles across the UK and passes within a mile of 55% of UK homes (Sustrans, undated). Whilst the NCN development and maintenance is a considerable achievement, involving in excess of 400 partners that include planning authorities, private and public landowners and other local groups, and also requiring considerable localised voluntary support, Aldred (2012) notes that it should be recognised that the NCN has emerged in a context in which cycling is viewed primarily as a local transport issue and not one of national strategic transport planning. NCN route provision has had to develop, therefore, without adversely affecting other modes of transport. This naturally brings with it compromises and limitations in terms of what the NCN can deliver with routes often being coincident with traffic or blocked by parking (Aldred, 2012).

Nonetheless, based on the Active People Survey (APS), which is a large-scale survey of physical activity in England, including cycling, this paper examines the association between the presence of NCN routes on the total minutes of any form of cycling, and the frequency in days, and the intensity of the effort on those days, in which recreational and utilitarian cycling takes place. The latter is distinguished as cycling for purposes such as commuting to work or undertaking errands, rather than for leisure. The research controls for the socio-economic circumstances of the individuals but, of more importance, for the first time in a large-scale national data analysis, the paper also examines the association of cycling with other physical activity from walking, and sport and recreation. This is a need that has been identified in the literature by Yang et al. (2010) and argued to be theoretically important because lifestyle physical activity will be an important mediating factor influencing cycling behaviour (Chatterjee et al., 2013).

The paper employs a Zero-inflated Negative Binomial regression model (ZINB) to analyze the data. This is because the data comprises 'over dispersed' counts bounded below by zero, in measuring the minutes or number of days in which the respondent cycled in the last four weeks prior to the interview.[2] One reason for the overdispersion is because the data are also characterised by excess zeros. In survey data such as the APS, respondents are asked about their behaviour over a particular time period, which in this case is four weeks. Zero responses to activity such as cycling could therefore reflect never having cycled at all as 'absolute' zeros, and 'relative' zeros that reflect not having cycled in the period asked of the survey but that the respondent may do so otherwise if the circumstances were different. It follows that not only can the ZINB model examine if access to NCN routes and participation in other physical activity are associated with the actual frequency of cycling behaviour, but also their impact on potential cycling through a consideration of the factors associated with a reduction in the incidence of the 'absolute' zeros in the data.

The paper proceeds as follows. The literature examining the benefits of active travel, particularly cycling, as well as the determinants of cycling behaviour and evidence on the impact of policy initiatives on cycling behaviour is briefly presented in Section 2. The data are described in Section 3, with the ZINB model presented in Section 4. Results are presented in Section 5, with a discussion of the implications of the research and its limitations in Section 6. Conclusions follow in Section 7.

2. Literature review

International literature suggests that active travel through walking and cycling has two main benefits for society. On the one hand, it can reduce congestion and environmental pollution (Ogilvie et al., 2004). On the other hand, it can improve the health of participants (Oja et al., 2011). Targeting policy to promote such behaviour consequently relies on identifying the factors that encourage active travel generally and, in the context of this paper, cycling specifically. Despite relatively recent arguments that, compared to walking, active travel research in cycling was undeveloped (Pikora et al., 2003), there is now a large literature addressing the determinants of cycling, employing a variety of different research designs (for a review see, for example, Heinen et al., 2010).

International surveys indicate that it is generally the case that both individual characteristics as well as social and physical environmental features such as geographic and transport related characteristics can influence cycling (Pikora et al., 2003; Panter and Jones, 2010). For example, Winters et al. (2007) in a study of commuter cycling in Canada identify that males and younger adults are more likely to cycle. The same is the case for those with a lower income, and higher education. Examining commuter cycling in England and Wales, Parkin et al. (2008) support these results and identify that with the exception of higher professionals, individuals in most socio-economic classifications cycle less than those of the lowest socio-economic classification. Less cycling is also identified for non-white ethnicities. Based on more recent Census data from 2011 for England and Wales, however, Goodman (2013a) argues that whilst active travel is more common for socio-economically disadvantaged groups, this may soon reverse for cycling overall and recreational cycling is more likely to be positively associated with affluence.

Overall, therefore, some of this literature can suggest that having lower income promotes cycling behaviour because it is a cheaper transport alternative. Not surprisingly, studies also identify that car availability reduces cycling in England and Wales (Parkin et al., 2008), and an increase in the cost of fuel (Buehler and Pucher, 2012), or higher car-parking charges, increase commuter cycling (Rietveld and Daniel, 2004) in US cities and Dutch municipalities respectively. Similarly, modest financial incentives, good parking and shower facilities at work have a positive effect on the level of cycling to work in England (Wardman et al., 2007). However, the results linking the highest incomes and white ethnicities to greater cycling

[2] The precise definition of overdispersion is discussed in Section 4.