Financial Incentives to Promote Active Travel
An Evidence Review and Economic Framework

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Context: Financial incentives, including taxes and subsidies, can be used to encourage behavior change. They are common in transport policy for tackling externalities associated with use of motor vehicles, and in public health for influencing alcohol consumption and smoking behaviors. Financial incentives also offer policymakers a compromise between "nudging," which may be insufficient for changing habitual behavior, and regulations that restrict individual choice.

Evidence acquisition: The literature review identified studies published between January 1997 and January 2012 of financial incentives relating to any mode of travel in which the impact on active travel, physical activity, or obesity levels was reported. It encompassed macroenvironmental schemes, such as gasoline taxes, and microenvironmental schemes, such as employer-subsidized bicycles. Five relevant reviews and 20 primary studies (of which nine were not included in the reviews) were identified.

Evidence synthesis: The results show that more-robust evidence is required if policymakers are to maximize the health impact of fiscal policy relating to transport schemes of this kind.

Conclusions: Drawing on a literature review and insights from the SLOTH (sleep, leisure, occupation, transportation, and home-based activities) time-budget model, this paper argues that financial incentives may have a larger role in promoting walking and cycling than is acknowledged generally.
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Context

During the past century, most developed countries have witnessed a considerable rise in the prevalence of obesity.[1] A dominant view among economists is that this trend is attributable largely to a utility-maximizing response of individuals to technologic progress that has decreased the price of energy intake (via reduced food prices) and increased the price of energy expenditure (via growing opportunity costs of physical activity).[2] Table 1 shows the impact of these changes on the costs people face when making decisions about physical activity and food consumption during their daily leisure, work, travel, and home-based activities. For example, technologic innovation in agriculture, food production, and retail has contributed to reduced costs (including time costs) of energy-dense meals, and working environments typically have become more office-based and sedentary.

The present paper is concerned primarily with the impact on decision making of changes in the cost of travel. Travel is a hitherto relatively under-exploited area for promoting health behavior change, but is potentially important in the "small changes approach" to tackling obesity, which focuses on small but achievable improvements in physical activity rather than more-substantial lifestyle changes that have sometimes proven unrealistic.[3] Because cycling and walking can be integrated more readily into people's busy schedules than, for example, leisure-time exercise,[4,5] these could represent low-cost, acceptable, and accessible ways to achieve 30 minutes of daily, moderate-intensity physical activity as recommended in international guidelines to help prevent obesity and more than 20 other chronic conditions.[6–10]

More specifically, the current paper explores the potential for financial incentives to encourage physical activity through active travel and influence related health outcomes. Financial incentives are policies involving a targeted payment to, or withdrawal of monetary resources from, an individual's budget. They encompass interventions at the macroenvironmental (e.g., govern-

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Table 1. Examples of the impact of technologic progress on the costs of energy intake and energy expenditure

	Costs of energy expenditure		Costs of energy intake
Activity domain	Increasing opportunity costs of energy expenditure	Increasing monetary costs of energy expenditure	Decreasing costs of food consumption
Sleep	N/A (The time spent sleeping has remained broadly constant)		
Leisure	Greater opportunity for sedentary leisure activities (e.g., TV, computers, and the Internet)	Greater availability of active leisure facilities away from home that incur a financial cost (e.g., leisure centres, swimming pools, and gyms)	Increased availability of restaurants (including fast-food)
Occupation	Greater availability of, and higher wages associated with, sedentary work	The change from an agricultural or industrial society means that, in a sense, people are no longer paid to exercise at work.	Greater availability of mass-produced, energy-dense, packaged, snack foods which can be consumed "on the go" (and are often heavily marketed, perhaps appealing to a lack of self-control and hyperbolic discounting which apparently characterizes food consumption)
Transportation	Availability of motorized transport and investment in road networks has provided greater opportunities for faster and longer-distance journeys which are not well suited to active travel modes	N/A	Expansion of "Drive-Thru" takeaway services which allow consumption of fast-food while traveling
Home	Modern technology (e.g., gardening tools and kitchen appliances) allows household chores to be done more quickly with less physical effort	N/A	Transfer of labor-intensive food preparation to intensive farming, supermarkets, and factories, has dramatically reduced the costs (including time costs) associated with food preparation at home. The availability and quality of kitchen appliances such as microwaves, refrigerators, and freezers also have improved.

N/A, not applicable

ment) and microenvironmental (e.g., workplace) levels,[11] including positive financial incentives[12] rewarding active travel and negative financial incentives penalizing sedentary travel.

Evidence Acquisition

Identification of Relevant Studies

The review identified studies of financial incentives relating to any mode of travel in which the impact on active travel, physical activity, or obesity levels was reported. The ECONLIT, Google Scholar, National Bureau of Economic Research (NBER) and PubMed electronic databases were searched between May 2011 and January 2012 with terms relating to "physical activity," "transport," "built environment," and "prices." Non-English-language papers, and studies published before 1997, were excluded. Five relevant reviews and 20 primary studies (of which nine were not included in the reviews) were identified (Table 2).

Data Extraction and Quality Assessment

Information was extracted on study place and year; study design; intervention and population characteristics; and results. Quality assessment focused on the likelihood that causal inferences may be drawn,[13] based on a method originally devised for use in criminology reviews.[14]

Evidence Synthesis

Description of Studies

The majority of studies (70%) presented evidence for a particular microenvironmental scheme. Together, only a small range of schemes were represented, predominantly involving free bicycles or local road pricing at specific locations and generally within particular population subgroups. The majority (67%) of intervention studies used uncontrolled cross-sectional analysis of population-level data, which cannot support robust causal inference. Further, most considered only changes in travel behavior or physical activity (87%), so improvements in health or reductions in obesity only can be estimated. Higher-quality study designs used included RCTs (20%), although, as with other the intervention studies, these often had short follow-up periods (average 7 months).