Promoting sustainable travel behaviour through mobile apps

An evaluation of persuasive elements embedded in mobile apps that promote sustainable travel, found that some successful features crucial for travel behaviour change are missing. Recommendations are made for further research and development of applications for small scale interventions.

With their widespread adoption and persuasive use in society, smartphones can be used to deliver large-scale and cost-effective travel behaviour change interventions. A behaviour change support system (BCSS) builds on the tradition of persuasive technology and is an information system designed to form, alter, or reinforce attitudes, behaviours or an act of complying without deception, coercion or inducements.

The study examines the use of persuasive technology, in particular, BCSSs, designed to promote sustainable travel behaviour. It undertook a literature search and evaluated the persuasiveness and effectiveness of nine identified mobile applications (in Austria, Finland, Italy and the US). The BCSSs differed in size of consortium involved and resources available for their development. They aimed to influence distance travelled, number of car trips or frequency of use, time spent in a car, and measures of modal shift away from car use or away from single car occupancy.

Common techniques used in the BCSSs included personalisation (found in all applications) and self-monitoring (in eight applications). Tunnelling, guiding the user through a process or stages of behaviour change, was the least utilized feature. Simulation and rehearsal are also less utilized features. BCSSs that support rehearsal provide journey or trip plans to the users, while those support simulation provide the means of observing the effect of following a plan.

Persuasive technology places strong importance on the appeal of design (liking). Since the applications also have sensing capabilities, it is easy for them to mimic their users in some way (similarity).
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Rewards are implemented in the form of badges, points/icons, discounts or concessions given as incentives every time the desired behaviour is performed. Suggestions are made to try alternative modes, routes, travel plans, or pursue mobility challenges or goals or to review them.

Of the nine mobility BCSSs reviewed in the study, seven included evaluation of usability. However, only three attempt to evaluate the effectiveness of behavioural change interventions. These three all employ cohort-uncontrolled evaluations (e.g. before-after comparison, without adequate control groups) and are considered of low methodological quality which threatens the validity of the result.

In the absence of proper evaluations studies of the efficiency of mobility BCSSs, the study examined studies on health BCSSs, where evaluations are more developed. They found in a meta-analysis of health BCSSs that the intervention effects of BCSSs is small. Future studies are needed to develop BCSSs in the domain of transport to have a greater intervention effect.

The study recommends that a stage-based behaviour change model should be incorporated in the design of BCSSs. Stage-based models specifies the stages in the process of behaviour change. These models can be used to determine the user’s current stage of membership (tailoring) and then guide them to next stages in the process (tunneling). Travel behaviour change in mobility requires formation of an implementation of intention, which is greatly facilitated by a provision of an appropriate travel plan (rehearsal) with its corresponding benefits (simulation).

The study concludes that if a mobility BCSS is to have a greater intervention effect it needs to include the provision of a dynamic cross-modal trip planning tool (rehearsal), together with potential effects or outcomes (simulation feature). The use of real-time ridesharing, where travellers are grouped together in common trips by car or van, is increasingly seen as a demand management strategy to alleviate traffic congestion. A mobility BCSS that supports cross-modal planning in real time may have greater chances of achieving behaviour change.

Although smart devices can be utilized for a medium of intervention to promote sustainable behaviour change, the study warns that besides a bias towards a younger population group, there is evidence that active usage of smart devices can generate negative attitudes to the use of public transport.