10th International Conference on Transport Survey Methods

A Web-Based Diary and Companion Smartphone app for Travel/Activity Surveys

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Abstract

This paper details the development and deployment of an online seven day travel/activity diary and companion smartphone app in Sydney, Australia. The diary employs several innovative features to simplify data entry, while the app generates maps to assist recall. Based on 847 participants, 76% complete all seven days, 16,361 of 16,386 recorded trips are provided with complete details, trip entry times average two minutes/trip and three-quarters of trips entered within 24 hours of being made. Over half the participants download the app with strong indications this improves the accuracy of trip reporting.

Keywords: Online travel diary; smartphone app; participant recall

1. Introduction

Designers of travel surveys are continually searching for approaches to improve the quality of data collected, encourage participation and reduce participant burden, while keeping costs down (Stopher and Greaves, 2007). New technologies have played, and will continue to play, an increasingly important role in achieving this goal, both in terms of providing new opportunities for interacting with participants and (passively) collecting location data. Building on this, there is growing interest in using smartphones because of the options they provide for participant

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interaction, tracking (GPS, Wi-Fi, mobile network location, Bluetooth), and pragmatically, their increasing proliferation within the population (for instance, two-thirds of Australians now own a smartphone). This has manifested in several efforts to design surveys using smartphone capabilities (Abdulazim et al., 2013; Fan et al., 2013). However, diaries will remain crucial to many applications and, for this reason, methods that make use of smartphones to improve the diary experience rather than simply replace them are of particular interest.

Within this framework, the current paper details the development and deployment of an online travel/activity diary and companion smartphone app, designed to support a major study of travel in inner-city Sydney, Australia. Briefly, the aim of the study is to investigate changes in travel behaviour and health indicators of residents before and after the construction of a major piece of cycling infrastructure (Rissel et al., 2013). The diary, designed to run for seven days, employs several innovative features to simplify the process of data entry, and improve participant recall and completeness of travel data. These features include auto-fills, prompting for public transport access mode, and the ability to save and recall favourite trips. The smartphone app uses Wi-Fi and network location capabilities of participants' own phones to passively record their travel during the survey period. These positioning methods do not drain the phone battery as much as GPS, and are therefore appropriate for 24 hour use over seven days. The location data is used to generate daily travel maps, which the participant can view while completing the online diary, as well as to verify trip details reported in the diary.

Pilot testing of an earlier version of the diary on 37 participants produced a largely positive reaction with 89% of participants completing all seven days of the diary and 75% of participants indicating no issues once they become accustomed to how it worked (Greaves et al., 2014). Trip entry times averaged around two minutes per trip, with 75% of trips entered within 24 hours of being made and 96% of trips provided with complete details. This version of the diary did not include the smartphone app; rather, participants carried a small GPS device with them, the data from which was found to be less complete and of lower quality than that recorded in the diary. However, it emerged that those carrying the GPS device appeared to be more diligent in recording travel information in the diary, supporting findings that have been reported elsewhere (Stopher and Greaves, 2010).

Following pilot testing, an updated diary and smartphone app were developed and deployed for the main wave of the fieldwork. The current paper reports on the findings from 847 participants recruited into the first wave of the study during the Australian spring of 2013. The large sample provides a robust opportunity to gauge participant comprehension and interaction with the diary and app, reaction and burden, and completeness of data provided and observe how this varies by key demographic indicators. Following this, we assess the impacts of the app on levels of reporting, by comparing key trip metrics from the diary for those who installed the app versus those who did not. Finally, we draw conclusions about the merits of the approach, providing guidance for survey designers considering similar approaches in the future.

2. Literature Review

Travel diaries have been used extensively to collect the individual and household travel data required for a range of planning applications (Elango et al., 2007; Transport Data Centre, 2009), as well as more targeted studies of travel behavior (Hensher and Reyes, 2000). While much has been written about the design of 'good' diaries, the principles suggested by Kenyon (2006) capture the essentials: namely that the diary should be quick and intuitive to complete, have a shallow learning curve, and prompt participants for the required information at every stage. Despite continuing improvements in design, diary surveys continue to be plagued by declining response rates, errors caused by misinterpretation, skewing towards more literate population cohorts, etc. (Richardson et al., 1995). These problems become accentuated for multi-day diaries, with evidence suggesting increasing rates of activities and trip details being forgotten, or inadvertently telescoped to the wrong day (Stopher and Greaves, 2010).

In theory, the migration from a paper-based to web-based environment provides greater potential to address these issues, while at the same time engaging participants through user-friendly interfaces underpinned by logic that minimises the input time required and potential for error. In practice, some of these advantages have been eroded by the tendency to replicate paper-based diaries in an online environment and to over-estimate the ability/willingness of participants to complete the instrument. For instance, Theriault et al. (2013) developed a web-based version of a paper diary to study car share behaviour in Quebec over one week. While the survey employed many innovations, the number of fields on one page, 96 in total, was overwhelming, with just over one-third of participants completing