



## Evaluation of a walking school bus service as an intervention for a modal shift at a primary school in Spain



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### ABSTRACT

In recent decades, the proportion of students using motorized transportation to school has increased while active transportation has decreased. The walking school bus is one of the most used interventions aiming to reduce problems resulting from this trend. However, no studies have analysed the influence of a WSB service provided by professional monitors on a shift in modes of transportation.

This study investigated a pioneer daily walking school bus service guided by paid staff implemented at a primary school in Córdoba, Spain. A mobile app is used to register the children's participation and to provide the parents with real-time information on the group's location and arrival at the destination. Collected data, including the families' responses to a questionnaire were used to assess participation and the shift in modes of transportation.

During the pilot study, a high recurrence in the children's participation was found and 43.7% of the participants had completely or partially changed transportation modes. The families reported fewer problems in the children's daily school travel organization and an improvement in their pedestrian safety behaviours. Further, 92.1% of the participating families had less concern about their children's autonomous walking.

Results indicate that a walking school bus service guided by paid monitors can be an effective way to increase active travel to school, especially for children who live further from it. The use of the mobile app can reduce parents' concerns and facilitate the management and evaluation of the method. Implications are discussed for future Active Travel to School interventions that focus on changes in modes of transportation.

### 1. Introduction

Children's modes of transportation to school have changed significantly during the past few decades, with an increase in parents driving their children to school and a decrease in walking to school (Fyhri et al., 2011; McDonald et al., 2011). As a result, fewer primary school students are now autonomously walking to school. The increase in driving children to school has caused problems at the urban level (Marique et al., 2013), in the daily organization of families (McDonald, 2008; He, 2013), and related to children's health and psychosocial development (Mackett, 2013; Foster et al., 2014).

In this context, a variety of activities and transportation policies have been developed to decrease the number of children driven to school and to promote active travel to school (ATE, 2007; NCSRTS, 2007; Chillón et al., 2011; Green Communities Canada, 2011). Many of these measures are based on improvements to infrastructure for pedestrian travel.

However, some studies point out that the low efficiency of some of these projects might be because they do not meet families' needs (McDonald and Aalborg, 2009; Stone et al., 2014).

The problems related to primary school students' mobility must be understood in the context of household decisions (Faulkner et al., 2010). Some of the major factors that influence families' modes of transportation are the distance to the school, the parents' concerns about traffic or the possibility that their children might be hurt, and work-school time restrictions (Stewart et al., 2012).

Among the alternatives of the Active Travel to School projects, the walking school bus (WSB) is a promising intervention; however, the benefits and potential to trigger changes in transportation routines have yet to be widely studied (Smith et al., 2015). The WSB consists of a group of children that walks to school accompanied by one or more adults, usually along a previously agreed-on route with possible intermediate stops. The WSB could be an appropriate way to overcome the major

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barriers to active transportation, such as families' fears related to autonomous walking, parents' needs to escort their children, and the distances that the children walk (Stone et al., 2014). Although the WSB solution does not offer complete autonomy to the children, it could be a valuable tool to reduce fears about children walking unaccompanied by their relatives and to help parents feel comfortable about their children walking to school.

Several studies have identified many advantages, challenges, and limitations of WSB (Table 1). The major benefits to participants or other people involved in a WSB programme are the time saved by the parents (Kearns et al., 2003), health benefits (Collins and Kearns, 2005; Kearns et al., 2003; Kingham and Ussher, 2007), increased sense of community (Collins and Kearns, 2010; Kingham and Ussher, 2005), children's socialization (Kearns et al., 2003; Kingham and Ussher, 2005), children's greater independence (Kingham and Ussher, 2005), and a high level of participant satisfaction with a healthy and supportive environment that promotes social interaction and physical activity (Kong et al., 2009).

However, the previous studies all refer to WSB as staffed by volunteer adults. Although this approach could positively influence parents' decisions to not use their cars, Collins and Kearns (2010) pointed out that taking part as accompanying adults is an additional burden and liability on the families, which reduces the convenience to the families that are relatively willing to use it. Thus, the difficulty obtaining volunteers becomes a major barrier to the sustainability of WSBs. Smith et al. (2015)

suggested paying the WSB coordinators/monitors and using mobile applications to support WSB management as possible solutions to recruitment and liability problems.

Furthermore, although there is evidence that WSB promotes an increase in the number of children that walk to school, it has been evaluated using self-assessment questionnaires, which can produce social desirability bias (Heelan et al., 2009; Mendoza et al., 2009, 2011). Only Collins and Kearns (2005, 2010) estimated the savings in car trips achieved by the WSB. However, they used indirect methods, such as personal estimates provided by WSB coordinators and survey data.

Moreover, mobile technologies currently have a particularly relevant role in the daily organization of personal transportation. Some activities, such as checking on bus locations in real time (Watkins et al., 2011) or identifying a group of individuals for carpooling (Shaheen et al., 2016), have become increasingly common. Public administrations also are beginning to understand that dynamic transportation data allow them to devise more effective plans for transportation infrastructure and services (Yujuico, 2015). These trends are helping to develop an emerging discipline known as Computational Transportation Science (Winter et al., 2011). In this sense, new technologies could be useful (Dickinson et al., 2015; Weiser et al., 2016) for promoting the creation of WSB groups at educational centres, management of the daily development of WSB and communication among the participants, and for the collection of real-time operational data.

**Table 1**  
Previous studies about Walking School Bus (WSB) programmes.

Study	Study Site	Methods	Results
Kearns et al., 2003	One school in Auckland, New Zealand	Evaluation of one school's WSB, survey to participants' parents (16), conversations with WSB drivers and children, interviews with people responsible for road safety (7)	Although health, social and time-saving benefits were reported by the participants, the authors concluded that WSBs were an ambivalent response to the hegemony of motorized transport.
Collins and Kearns, 2005	Auckland, New Zealand	45 interviews with 23 school representatives (mostly principals) and 22 WSB coordinators conducted providing information on 29 of 34 schools with WSBs in Auckland	Participants identified benefits from WSBs, e.g., an estimated 429 saved vehicle journeys each day. However, the authors concluded that WSBs had a limited ability to address public health challenges in an inequitable and car-dominated urban political system.
Kingham and Ussher, 2005, 2007	Christchurch, New Zealand	A combination of interviews (33) and questionnaires with people conducting some WSBs	The authors concluded that WSBs suffered a significant decline in the long term. Some of the difficulties identified were: a lack of volunteers, lack of children wanting to make the journey alone, and insufficient ongoing support from the school or council.
Heelan et al., 2009	Nebraska, US	The prevalence of walking to school was evaluated by self-report six times, and the objective physical activity levels among a sample of research participants (201 intervention children and 123 control children) in two WSB intervention schools and one control school were compared by having participants wear an accelerometer four times.	A significantly greater percentage of children actively commuted to and from WSB schools compared with control schools at each later time point.
Kong et al., 2009	Albuquerque, New Mexico, US	A feasibility trial used a process evaluation of two WSBs at an elementary school with 29 participants (kindergarten through fifth grade students living within a one-mile radius of school). Qualitative and quantitative data were obtained from field notes, attendance records, student and parent satisfaction surveys, focus groups, and interviews with two lead coordinators.	Student and adult participants reported high levels of satisfaction with the WSB. The authors concluded that WSB studies in urban, underserved school districts were feasible but required attention to ensure participants' involvement and safety and stakeholder investments.
Mendoza et al., 2009	Seattle, WA, US	This study assessed students' methods of transportation to school in a classroom survey at baseline and a one-year follow-up. There was an intervention school with a WSB program with volunteer parents and a part-time coordinator and two control schools.	Although no significant differences between proportions of students walking to school at intervention and control schools at baseline were identified, significantly higher proportions of students walked to school at the intervention school than control schools, and this result was maintained over time.
Collins and Kearns, 2010	Auckland, New Zealand	This research was a longitudinal assessment of the major WSBs in Auckland primary schools using telephone interviews and questionnaires. Slight changes from 2002 to 2006 were found.	The number of WSBs was growing, but most activity remained in the wealthiest areas. Some of the reported benefits of WSBs were sense of community, opportunity for exercise and health promotion, reduction in car use and local congestion, and reduced risk of injury for child pedestrians.
Mendoza et al., 2011	Houston, TX, US	Pilot cluster randomized control trial with four intervention and four control schools. Intervention schools had one to three WSBs with trained staff to and from schools five days per week. The percentage of trips made by active commuters was assessed using a questionnaire. Minutes per day of moderate to vigorous physical activity (MVPA) were measured using GT1M accelerometers worn by students for seven days.	Intervention schools increased active commuting (AT), whereas control schools decreased AT. Intervention children increased the daily MVPA from 46 to 48 min, whereas control children decreased MVPA from 46 to 41 min. The WSB children achieved 7 min/day more MVPA than control children.

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