

# Is car orientation among families with children on the wane? Evidence from Melbourne, Australia

Laura McCarthy<sup>1</sup>, Alexa Delbosc<sup>1</sup>, Graham Currie<sup>1</sup> and Andrew Molloy<sup>2</sup>

<sup>1</sup>Department of Civil Engineering, Institute of Transport Studies, Monash University, 23 College Walk, Clayton, Victoria 3800, Australia

<sup>2</sup>Department of Economic Development, Jobs, Transport and Resources, Victoria, Australia

Email for correspondence: [laura.mccarthy@monash.edu](mailto:laura.mccarthy@monash.edu).

## Abstract

While a wide body of research supports the notion that the travel behaviour of families with young children tends to be car orientated, recent literature suggests a more varied set of travel practices are emerging among this group. Using data from a large-scale Victorian household travel survey, we explored whether changes are evident in levels of car orientation among three household groups. The three groups were selected to broadly represent a sequential order of life stages: Young Couples, Young Families, and Families with School-Age Children. Chi-square tests and two-tailed t-tests were used to compare changes in transport and household characteristics between 2007 and 2013-14.

Vehicle trips decreased for all groups between 2007 and 2013/14; the decline was greatest among households with children present, both young and school-age. Further, the results also show walking trips increased for all three groups. This demonstrates that a shift towards less car orientated travel behaviour is indeed apparent among families with young and school-age children in Melbourne. However, further research is required to understand the causes of the decline and to examine evidence of the decline in other localities.

## 1. Introduction

Many developed nations have policies aimed at reducing levels of private car use. However, the formation of effective car reduction policies requires an understanding of how the travel needs and aspirations of households and individuals vary at different life stages (Müggenburg, Busch-Geertsema et al. 2015). This research need has prompted a wide body of literature examining travel behaviour at different life stages (Zimmerman 1982, Kitamura 1988, Rosenbloom 1993, Ryley 2006, Kitamura 2009, Oakil, Ettema et al. 2014).

Research within the life stage approach supports the notion that the travel behaviour of families with young children tends to be car orientated (Kitamura 1988, Ryley 2006, Zwerts, Janssens et al. 2008, Kitamura 2009). However, recent literature, primarily from Europe and North America, suggests a more diverse set of mobility practices are emerging among this group (Lanzendorf 2010, Schwanen 2011, McLaren 2016).

The emergence of this literature, together with the apparent success of policies promoting sustainable travel among the general population (see, for example, Buehler, Pucher et al. 2016), suggests that it may now be timely to question the widely held assumption that car orientation characterises travel for families with children. Is a shift towards more sustainable travel behaviour evident among such families? And, if so, is this shift apparent in auto-orientated cities, such as Melbourne, Victoria?

This paper examines whether the shift towards less car orientated travel behaviour is evident among families with children in Melbourne, Victoria. It does this using household travel survey data from two periods, 2007 and 2013-14, to analyse the travel and household

characteristics of three household groups: young couple households without children, households with pre-school aged children, and households with school-aged children.

After discussing the relevant literature (section 2), and describing the data analysis methods (section 3), this paper outlines the results of this analysis (section 4). It concludes with a discussion and outlines areas for future research.

## 2. Methods

This analysis aims to examine trends in mode use among families with young children in order to understand whether car orientation is declining.

### 2.1 Data source

The travel behaviour of household groups has been explored using data from the Victorian Integrated Survey of Travel Activity (VISTA). VISTA is a large-scale household travel survey conducted across Greater Melbourne and regional Victoria. This analysis uses data from the 2007, and 2013-14 survey years from the Greater Melbourne sample.

Randomly selected households completed the survey. The VISTA household travel survey captures a range of data about the household, including household income, size, and car ownership levels. In addition, all household residents, excluding those aged 0 to 4, complete an individual household travel diary for a specified day. The individual travel diary captures demographic characteristics and detailed information about their daily travel.

The 2007 VISTA (VISTA07) survey obtained data from approximately 17,000 households across Victoria, while the 2013 and 2014 VISTA surveys (VISTA13-14) comprise data from approximately 8,400 households. We combined data from the 2013 and 2014 surveys to ensure there was a sufficient sample size in each of the household groups to allow for segmentation of the results by different household characteristics. Person weights were applied to the dataset.

We explored three household groups of interest in both the VISTA07 and VISTA13-14 survey datasets. We selected these groups to broadly represent a sequential order of life stages:

- **Group 1: Young Couples**
  - In a spousal relationship (de facto or marital)
  - One or both partners aged between 20 and 39
  - Two person household
- **Group 2: Young Families**
  - Any size households with at least one child aged between 0-4
  - Single or dual parent households
  - No children aged between 5 and 14
- **Group 3: School-age Families**
  - Any size households with at least one child aged between 5 and 14
  - Single or dual parent households
  - No children aged between 0 and 4.

We excluded survey data for the remainder of the population, which did not fall into these three groups, from the analysis. Households with children aged between both 0-4 and 5-14 were excluded in order to isolate the influence that the presence of pre-school children and school-age children has on household travel behaviour.

## 2.2 Data limitations

As VISTA is a cross-sectional survey, we are not observing the same groups of people over time. As such, it is not possible to disentangle life cycle effects from cohort effects among the three groups used in this analysis. Further, the analysis comprises data from two survey periods; while both provide large samples, the timeframe between the two surveys is relatively short, and the limited number of years included in the analysis makes it difficult to derive conclusive results regarding long-term trends. Due to changes in survey methodology, data from earlier Victorian travel surveys is similar, but not directly comparable. For example, VISTA 2013-14 included an additional prompt to capture incidental walking trips, which is partially responsible for an overall increase in walking between the two survey years.

Finally, the statistical procedures used in this study, descriptive and comparative analysis, are not sufficient to simultaneously control for effects such as income or housing location on mode-use.

## 2.3 Analysis methods

Chi-square tests and two-tailed t-tests were used to compare changes in car orientation between 2007 and 2013-14, among the three household groups.

The analysis comprised two stages. First, in order to understand whether car orientation has declined among families with young children, we conducted a comparative analysis of the VISTA07 and VISTA13-14 datasets. Independent sample t-tests were undertaken to compare changes between the two survey periods, for each household group, for following variables:

- household location
- mean household vehicle ownership
- mean per-person vehicle trip
- the proportion of vehicle trips.

Changes between the two periods were deemed measurably different if the significance (2-tailed) value was equal to or less than 0.05.

## 3. Results

### 3.1.1 Changes in transport characteristics between 2007 and 2013-14

As depicted in Table 4, mean per-person vehicle trips *decreased* for all groups between 2007 and 2013/14; the change was greatest among Group 2 (decreasing by 0.33 mean pp trips) and Group 3 (decreasing by 0.35 mean pp vehicle trips). Conversely, walking trips increased among all three groups. The increase was greatest among Groups 1 and 2, increasing by 0.11 and 0.14 mean pp walking trips respectively. Between the two survey years, the number of vehicle trips remains highest among Group 3 and lowest among Group 1. Walking trips remained the lowest among Group 3, and highest among Group 1. There were no statistically significant changes to public transport trips among Groups 1 and 2. However, public transport trips declined marginally for Group 3, by 0.03 mean pp public transport trips.

Slight changes are observed among mean vehicle ownership for the three groups, decreasing for Group 1 and 2 and slightly increasing for Group 3. However, the results of t-tests indicate the changes are not statistically significant.

**Table 1: Changes in transport characteristics between 2007 and 2013-14**

HH group	Transport characteristic	Survey Period	Mean	Std. Deviation	Statistical test
<b>Group 1: Young Couples</b>	Mean pp vehicle trips	2007	<b>2.29</b>	2.14	t(3,200) = 2.64, p=0.008*
		2013-14	<b>2.10</b>	2.03	
	Mean pp walking trips	2007	<b>0.45</b>	1.15	t(3,153) = -2.75, p=0.006*
		2013-14	<b>0.56</b>	1.13	
Mean pp public transport trips	2007	<b>0.34</b>	0.77	t(3,247) = -1.88, p=0.060	
	2013-14	<b>0.29</b>	0.70		
Mean vehicle ownership	2007	1.63	0.75	t(1,677) = 0.197, p=0.844	
	2013-14	1.62	0.73		
<b>Group 2: Young Families</b>	Mean pp vehicle trips	2007	<b>2.51</b>	2.07	t(4,079) = 5.38, p=0.000*
		2013-14	<b>2.18</b>	1.96	
	Mean pp walking trips	2007	<b>0.43</b>	1.03	t(3,655) = -4.22, p=0.000*
		2013-14	<b>0.58</b>	1.18	
Mean pp public transport trips	2007	<b>0.13</b>	0.52	t(3,964) = -1.07, p=0.285	
	2013-14	<b>0.15</b>	0.52		
Mean vehicle ownership	2007	1.81	0.72	t(1,194) = 0.64, p=0.526	
	2013-14	1.78	0.83		
<b>Group 3: School-age Families</b>	Mean pp vehicle trips	2007	<b>2.70</b>	2.49	t(10,080) = 7.73, p=0.000*
		2013-14	<b>2.35</b>	2.30	
	Mean pp walking trips	2007	<b>0.33</b>	0.87	t(9,291) = -4.33, p=0.000*
		2013-14	<b>0.40</b>	0.90	
Mean pp public transport trips	2007	<b>0.19</b>	0.60	t(10,098) = 2.50, p=0.012*	
	2013-14	<b>0.17</b>	0.55		
Mean vehicle ownership	2007	1.88	0.83	t(2,860) = -0.41, p=0.681	
	2013-14	1.90	0.78		

Source: Author's analysis of weighted VISTA 2007 and 2013-14 data.

Note: \*Indicates the change is significant at p<.05.

## 4. Discussion

### 4.1 Has car orientation among families with young children decreased?

Exploring changes in car orientation between 2007 and 2013/14 revealed that mean per-person vehicle trips declined for all groups included in the analysis. While the declines were small (a reduction of between 0.2 and 0.4 per-person vehicle trips in each of the three household groups), the greatest decline was among families with young and school-age children (Groups 2 and 3).

Private cars provide families with children an important means to access a range of activities, particularly within auto-orientated cities (Dowling 2015). Nonetheless, a wide body of research shows high levels of car use among families with children result in fewer social interactions (Andrews, Rich et al. 2014), lower levels of physical activity (Anderson and Butcher 2006, Candelaria, Sallis et al. 2012, Freeman and Tranter 2012) and increasing financial stress (Dodson and Sipe 2008, Kitamura 2009). Given the myriad of social, economic, and health problems resulting from high levels of car use among families with children, this evidence that car use is declining is a very promising finding.

Moreover, despite an increasing proportion of families with young children living in Melbourne's car orientated Outer suburbs, public transport use among young families has remained unchanged. This is a particularly remarkable finding given mean public transport trips declined for Group 3 (families with school-age children), and declined as a proportion of all trips for Group 1 (Young Couples).

## **5. Conclusion**

This analysis has revealed that a shift towards less car orientated travel behaviour is indeed apparent among families with young and school-age children in Melbourne. Given a wide body of literature highlighting the negative consequences of high levels of car use among families with children, this is a very promising finding. Further research is required to understand the causes of the decline and to examine evidence of the decline in other localities. This, in turn, will assist the formation of future transport policies tasked with reducing car use among this group.

## References

- Anderson, P. M. and K. F. Butcher (2006). "Childhood obesity: Trends and potential causes." Future of Children **16**(1): 19-45.
- Andrews, F. J., S. Rich, R. Stockdale and J. Shelley (2014). "Parents' experiences of raising pre-school aged children in an outer-Melbourne growth corridor." Health and Place **27**: 220-228.
- Buehler, R., J. Pucher, R. Gerike and T. Götschi (2016). "Reducing car dependence in the heart of Europe: lessons from Germany, Austria, and Switzerland." Transport Reviews: 1-25.
- Candelaria, J. I., J. F. Sallis, T. L. Conway, B. E. Saelens, L. D. Frank and D. J. Slymen (2012). "Differences in physical activity among adults in households with and without children." Journal of Physical Activity and Health **9**(7): 985-995.
- Dodson, J. and N. Sipe (2008). "Shocking the Suburbs: Urban Location, Homeownership and Oil Vulnerability in the Australian City." Housing Studies **23**(3): 377-401.
- Dowling, R. (2015). Parents, children and automobility: Trends, challenges and opportunities. Handbook on Transport and Development, Edward Elgar Publishing Ltd.: 526-538.
- Freeman, C. and P. Tranter (2012). Children and their urban environment: Changing worlds.
- Kitamura, R. (1988). "An evaluation of activity-based travel analysis." Transportation **15**(1-2): 9-34.
- Kitamura, R. (2009). "Life-style and travel demand." Transportation **36**(6): 679-710.
- Lanzendorf, M. (2010). "Key Events and Their Effect on Mobility Biographies: The Case of Childbirth." International Journal of Sustainable Transportation **4**(5): 272-292.
- McLaren, A. T. (2016). "Families and transportation: Moving towards multimodality and altermobility?" Journal of Transport Geography **51**: 218-225.
- Müggenburg, H., A. Busch-Geertsema and M. Lanzendorf (2015). "Mobility biographies: A review of achievements and challenges of the mobility biographies approach and a framework for further research." Journal of Transport Geography **46**: 151-163.
- Oakil, A. T. M., D. Ettema, T. Arentze and H. Timmermans (2014). "Changing household car ownership level and life cycle events: An action in anticipation or an action on occurrence." Transportation **41**(4): 889-904.
- Rosenbloom, S. (1993). Women's travel patterns at various stages of their lives. Full circles: geographies of women over the life course. New York, Routledge: 208-242.
- Ryley, T. (2006). "Use of non-motorised modes and life stage in Edinburgh." Journal of Transport Geography **14**(5): 367-375.
- Schwanen, T. (2011). Car Use and Gender: The Case of Dual-Earner Families in Utrecht, The Netherlands. Auto Motives: Understanding Car Use Behaviours. K. Lucas, E. Blumenberg and R. Weinberger. Bingley, Emerald Group Publishing Ltd: 39-62.
- Zimmerman, C. A. (1982). "The life cycle concept as a tool for travel research." Transportation **11**(1): 51-69.
- Zwerts, E., D. Janssens and G. Wets (2008). How the presence of children affects parents' travel behavior 4th International Conference of Traffic and Transport Psychology. Washington DC.