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**Proxy Responses in Self-Completion Travel Dairy Surveys**



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## **Proxy Responses in Self-Completion Travel Diary Surveys**

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**Abstract.** This paper examines the characteristics of proxy respondents and those completing the survey forms for proxy respondents in self-completed questionnaire Travel Dairy surveys. Using data from the Coastal South-East Queensland Travel Survey (CSEQTS), where a special question was included about who completed the Travel Diary, it was found that about 30% of respondents were proxy respondents. The young were more likely to be proxy respondents, while males of all ages were more likely to be proxy respondents than females of the same age. Females were most likely to be the ones completing the Travel Diary for people under 35 years of age, while persons of the opposite sex were most likely to complete the forms for proxy respondents above 35. It was shown that proxy respondents were more likely not to make any trips on the Travel Day, and for those who did travel, they had fewer Stops, and less travel time and travel distance than those who self-reported their travel. However, and very importantly, one has to be very careful in interpreting these results because of the confounding effects of the demographics of proxy respondents versus self-reported respondents. In particular, it is known that younger people, who have fewer Stops and less travel time and distance, are much more likely to be proxy respondents. Therefore, the Stops, travel time and travel distance for proxy respondents will automatically be lower than for self-reported respondents even if there were no effect of proxy reporting, itself, on reported daily travel.

## INTRODUCTION

Most urban travel surveys are conducted using one (or a combination of) three major survey methods; face-to-face interview, telephone interview, or self-completion questionnaire. Each of these methods has their own particular strengths and weaknesses in relation to quantity and quality of data that can be obtained and the cost of obtaining that data. One issue of particular significance is the extent to which respondents answer their own questions personally, compared to having others provide the answers for them. The situation of having others provide the answers is often referred to as “proxy reporting”.

The extent of allowable proxy reporting depends on the type and purpose of the survey. Proxy reporting is often allowed (and necessary) for very young and very old people, who would otherwise be unable to participate in the survey. The extent of allowable proxy reporting in other circumstances depends on the type of question and the purpose of the survey. Clearly, proxy reporting would not be allowable for attitudinal questions, where it is the attitude or opinion of the specific respondent that is being sought. For factual questions, however, the extent of allowable proxy reporting is more open to debate. For household and person demographic questions, it would often be allowable to accept a proxy response, if it could reasonably be assumed that the person providing the information would know the answers to the questions. For factual travel questions, however, the situation is not as clear, since not all household members would know what the other members of the household have done during the day, especially away from the home.

The extent of proxy reporting is often seen as being a function of the type of survey method being used. Face-to-face interviews should have the lowest level of proxy reporting, since the interviewer can see exactly who is providing the answers. Telephone interviews can experience a moderate level of proxy reporting because, while the interviewer is talking to the respondent, they cannot see exactly who is providing the information. In addition, it is often difficult to have all household members available for the interview within a reasonable timeframe, and deadline pressures may require that a proxy interview be performed (in preference to no interview at all). Self-completion questionnaires are potentially the most problematic, since there is no interviewer present to request that the information be provided by the specific respondent. For this reason, proxy responses in self-completion questionnaire survey are often seen to be a particular problem.

The South-East Queensland Travel Survey (SEQTS), conducted in Brisbane in 2003-04 and on the Gold and Sunshine Coasts in 2004, uses a self-completion travel diary as the primary means of data collection about daily travel patterns. Results obtained from the Brisbane survey (which was analysed before the Coastal survey commenced) suggested that trip rates were somewhat lower than expected, as illustrated by comparison with the previous surveys conducted in Brisbane in 1992. In particular, trip rates during the day for workers were lower than expected. It was suggested that this might have been due to the fact that if the diaries for these people were being completed by another member of the household, then it is precisely these types of trips that would be unknown to the “proxy” respondent. Therefore, while the average daily distance and travel time was consistent between the 1992 and 2003-04 surveys, the lower than expected trip rates were a source of ongoing uncertainty.

It was therefore recommended that for the 2004 Coastal SEQTS surveys, an extra question would be added to the travel diary, asking who had actually completed the diary. In this way, it was hoped to determine the extent of proxy reporting and the extent of any potential effect on reported travel. This paper describes the results of this analysis of proxy reporting in the 2004 Coastal SEQTS (CSEQTS) surveys.

## **THE SEQTS AND CSEQTS SURVEY PROCEDURES**

The SEQTS (and CSEQTS) methodology is based on a self-completion questionnaire, which is hand-delivered to, and hand-collected from, the survey households. This process is also supplemented by telephone motivational calls, telephone and postal reminders, and telephone clarification calls. This range of procedures has resulted in good response rates (for fully completed household diaries) of 60% for SEQTS and 58% for CSEQTS (1, 2).

There are three major components to the survey questionnaires; the Household Form, the Person Form and the Travel Diary forms. The Household Form collects information about the household and all vehicles in the household. The Person Form collects demographic information about all members of the household. The Travel Diary collects information about all out-of-home activities and travel in a 24-hour period on a nominated Travel Day. The activity and travel data is collected using a stage-based recording procedure, where all Stops made during the day are recorded along with the travel involved in getting to that Stop. A Stop includes traditional places such as home, work and shops, as well as “change mode” locations such as train stations and bus stops. All components of the questionnaire were identical in the SEQTS and CSEQTS surveys, with one exception. In the CSEQTS survey, an extra question was added at the end of each Travel Diary to ascertain who actually completed the Travel Diary.

## **THE EXTENT OF PROXY REPORTING IN CSEQTS**

Of the 7263 respondents in the CSEQTS survey aged 5 years or more who completed Travel Diaries, 6,410 (88%) were identifiable as either self-respondents or proxy-respondents. The remaining 12% could not be uniquely identified because they had not answered the proxy question (the question was included toward the back of the Travel Diary) and their response could not be reasonably imputed. Of those whose proxy status is known, 30% were proxy respondents (this also includes those where the interviewer filled out the form for them). Of these 30%, it is unknown whether the person completing the form did so in close consultation with the actual respondent (i.e. they acted as an interviewer, asking the questions and recording the answers) or whether they completed the form to the best of their knowledge without close consultation with the respondent. For the purpose of this paper, the latter is assumed.

To put this percentage in context it would be nice to compare it with proxy responses in other travel surveys. In face-to-face interviews, it is often assumed that there is no proxy reporting, although this might not always be the case. In some situations where it is difficult to make contact with one or more members of the household, it might be allowed to conduct a proxy interview via another member of the household. In telephone surveys, proxy interviews are much more common because of the limited time that one can keep the households members on the line and interested in the survey. The extent of proxy reporting is generally known because the interviewer knows to whom they are talking and who they are talking about, but often this information is not recorded. In self-completion questionnaire surveys, some degree of

proxy reporting is a certainty, but its extent is generally unknown because a proxy question (such as used in CSEQTS) is not included.

Despite the acknowledged existence (and potential effect) of proxy reporting in travel surveys, very little has been reported in the literature. While there have been many reports on proxy reporting in other fields such as general social surveys (3), epidemiological surveys (4), labour surveys (5) and lifestyle surveys (6), there has been very little reported about travel surveys. The two exceptions to this trend are the papers by Wargelin and Kostyniuk (7) and Badoe and Steuart (8). Both these travel survey papers, however, report on proxy interviewing in CATI surveys, and hence are not very comparable with the situation that would occur in a self-completion questionnaire survey. They should therefore be seen as a point of comparison, rather than as an absolute benchmark.

Using data from four cities in the US National Household Travel Survey 2001, Wargelin and Kostyniuk (7) report proxy respondent rates of 34% to 38% for persons over the age of 18 (i.e. excluding virtually all school students). The CSEQTS figure of 30% for a self-completion questionnaire may therefore be seen as broadly comparable and not excessively high, when compared to a CATI survey conducted with the assistance of an interviewer. It should also be realised that the CSEQTS results are for all respondents aged 5 or more, whereas the Wargelin and Kostyniuk (7) results are for respondents aged 18 and over. As will be shown below, the proxy response rates for those between the ages of 5 and 18 are very high. If the CSEQTS results were limited to those aged 18 and over, the proxy response rate would only be 23%, which would compare very favourably with the CATI figure of 34-38%.

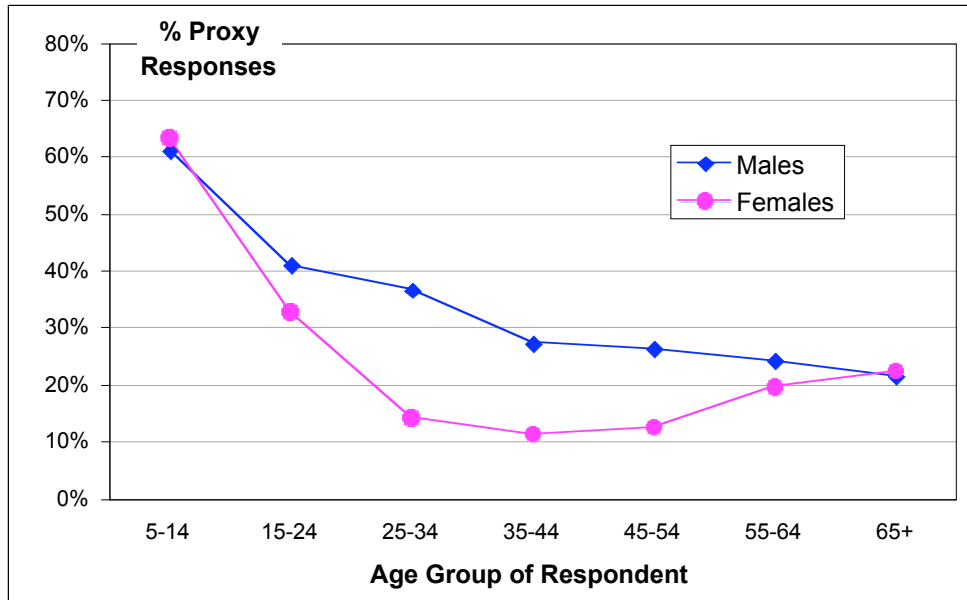
## **CHARACTERISTICS OF RESPONDENTS AND COMPLETERS**

The previous section has shown that CSEQTS has a proxy reporting rate of 30% for person aged 5 and over (all persons under 5 had travel diaries reconstructed from information on diaries of other household members), and a proxy reporting rate of 23% for person aged 18 and over (compared to the 34-38% found in the US NPTS surveys). While the CSEQTS survey has an average proxy response rate of 30%, the incidence of proxy responses is not uniformly spread across the population. This section examines the proxy reporting rate in terms of a number of demographic characteristics, including:

- the age and gender of proxy respondents
- the age and gender of proxy completers
- the relationships between proxy respondents and completers
- the activity status of proxy respondents
- the household size of proxy respondents

### **The age and gender of proxy respondents**

Figure 1 shows that while young males and females (<14 years old) are equally likely to have their Travel Diary filled out by someone else (about 60% proxy responses), the proxy rate varies substantially by gender as the respondent grows older. Working age men (25-55) are much more likely to be proxy respondents (about 30%) compared to working age women (about 12% proxy). Similar trends for age and gender were found by Wargelin and Kostyniuk (7), although their absolute rates were about 50% higher than the CSEQTS rates.

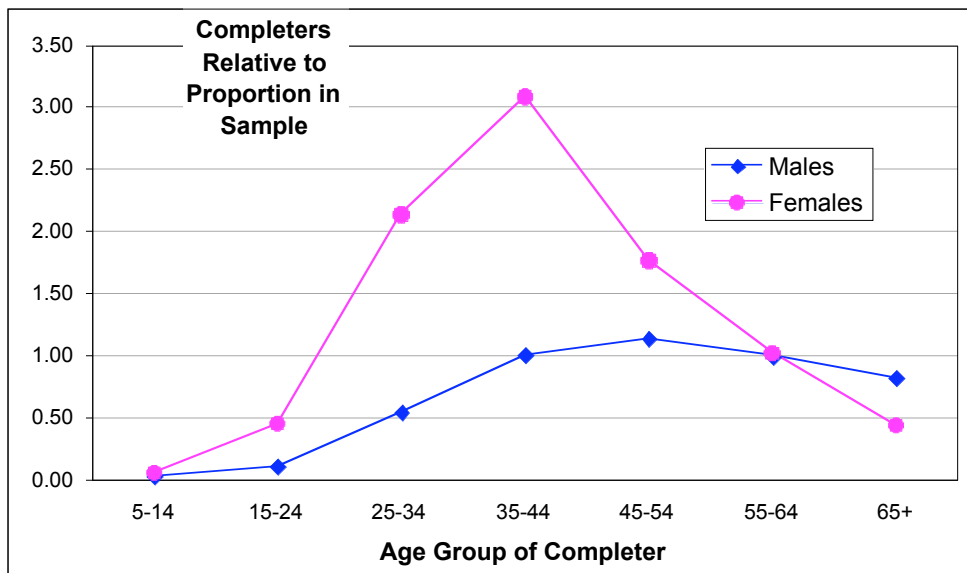


**FIGURE 1 Proxy Responses as a function of Age and Gender of Respondent**

It seems that across all age groups, males (35%) are more likely than females (25%) to have their Travel Diaries completed by someone else, but this difference is even more pronounced for working age males and females (30% of 12%).

### The age and gender of proxy completers

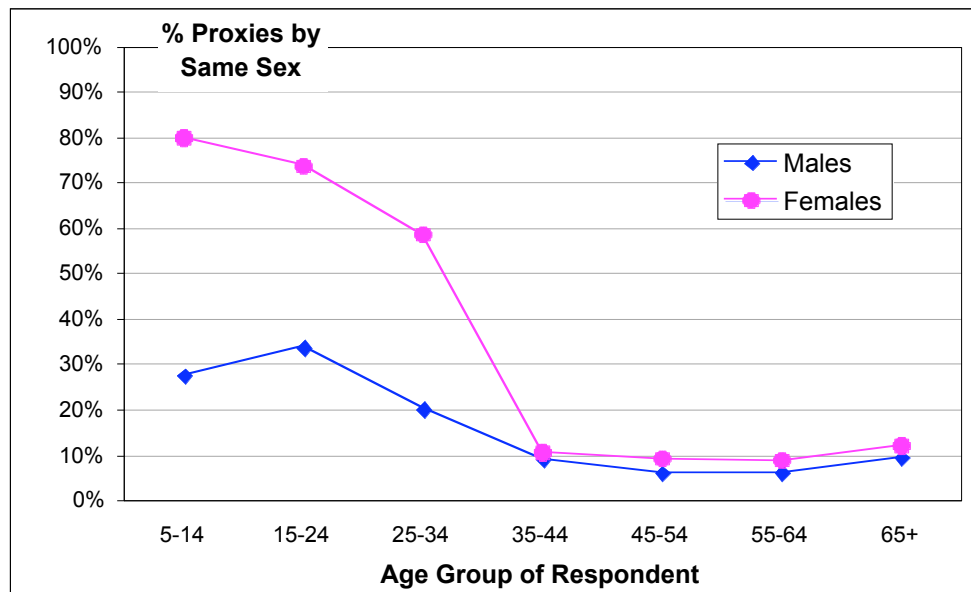
Just who is completing the Travel Diaries can be seen by reference to Figure 2, where it can be seen that females between the age of 25 and 55 are more likely to be completers of the Travel Diaries than their proportion in the total sample would suggest, where males of almost all ages are under-represented as completers of the Travel Diaries. It would appear that females are filling out the diaries for the males.



**FIGURE 2 Proxy Responses as a function of Age and Gender of Completer**

Whether this substitution of genders (between respondents and completers) is actually occurring can be seen by reference to Figure 3. For young female respondents (5-34 years), the completer is more likely to also be female (for the youngest age groups, this corresponds to mothers filling out the diaries for their daughters). For young male respondents (5-34 years), the completer is also more likely to be female (for the youngest age groups, this corresponds to mothers filling out the diaries for their sons). Above the age of 35, for both male and female respondents, the completer is overwhelmingly (about 90%) more likely to be of the opposite sex. However, since as shown in Figure 1 there are more males having their diaries filled out for them, this means that there are more females filling out the diaries, as shown in Figure 2.

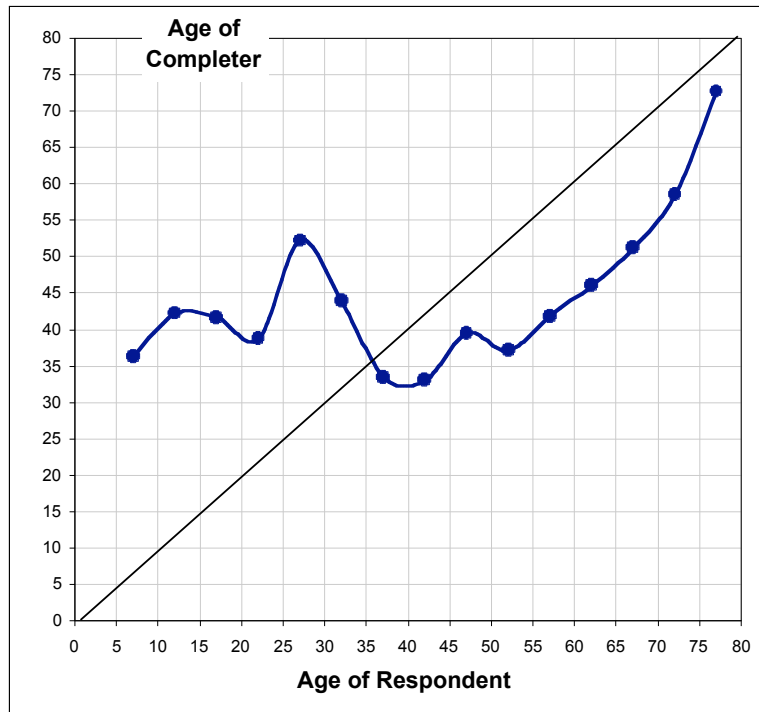
Thus, proxy respondent males of all ages are more likely to have their diaries filled out by females, whereas only proxy respondent females over 35 years of age are more likely to have their diaries filled out by males. That is, as a generalisation, mothers fill out the forms for their husband and the children, whereas husbands only fill them out for their wives.



**FIGURE 3 Gender of Completer relative to Gender of Respondent**

### **The relationships between proxy respondents and completers**

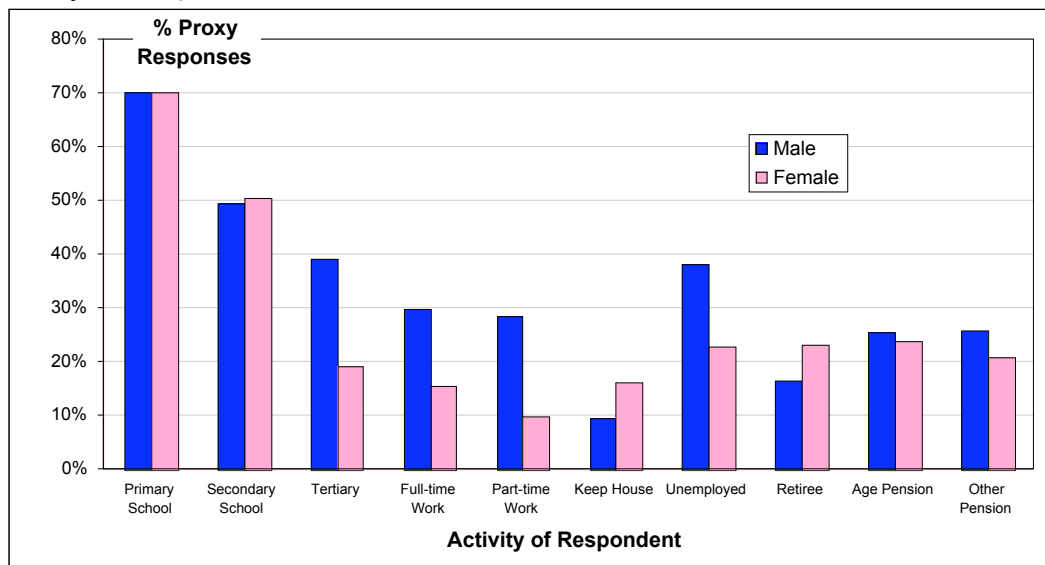
The relative genders of respondent and completer has been shown in Figure 3. The relative ages of respondent and completer is shown in Figure 4. It can be seen that from age 5 to 25, the completer is about 25-30 years older than the respondent. Between the ages of 25 and 40, the age of the completer falls compared to the age of the respondent, such that after the age of 35 the completer is generally younger than the respondent by 10-15 years. This corresponds to wives (who are on average younger than their husbands) more likely to be filling out the diary for their husbands, and to a greater proportion of children filling out the diaries for their aging parents.



**FIGURE 4 Age of Completer relative to Gender of Respondent**

### The activity status of proxy respondents

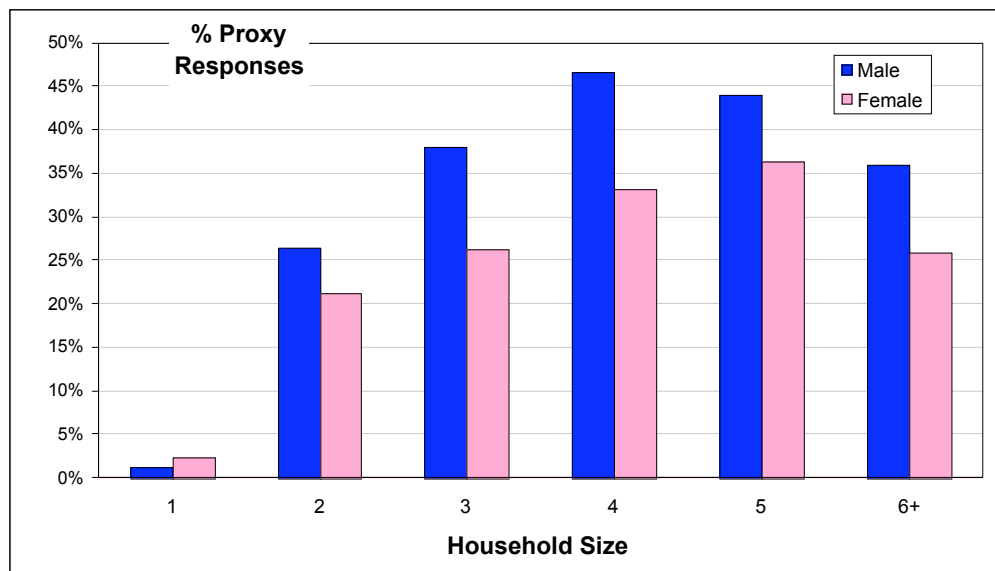
The extent of proxy reporting is a function of several other demographics. Figure 5 shows that those at school are most likely to be proxy respondents. Those in employment, especially males, are also more likely to be proxy respondents. The lowest proportion of proxy respondents is for those keeping house, where males are for once less likely to be proxy respondents than females (it seems that house-husbands are even more conscientious than house-wives in filling out their survey forms!)



**FIGURE 5 Proxy Response as a function of Activity & Gender of Respondent**

### The household size of proxy respondents

Figure 6 shows that, up to moderately large households, there is more proxy reporting in larger households. This corresponds to larger households having more school children who are more likely to be proxy reported. For very large households, the proportion of proxy reporting falls slightly. Even in single person households there is some proxy reporting, when the field interviewer fills out the forms for a single person household (usually an elderly resident). In virtually all household sizes, males are more likely to be proxy respondents than females. A very similar relationship between household size and proxy reporting was found by Wargelin and Kostyniuk (7).



**FIGURE 6 Proxy Response as a function of Household Size & Gender of Respondent**

### PROXY EFFECTS ON TRAVEL REPORTING

The previous section has shown that there are systematic variations in the proxy reporting rate across different demographic groups. None of this would be of great concern, however, unless there are also variations in travel reporting by self-respondents and proxy respondents. This section will examine whether such variations exist, and to extent to which such variations can be systematically described in terms of:

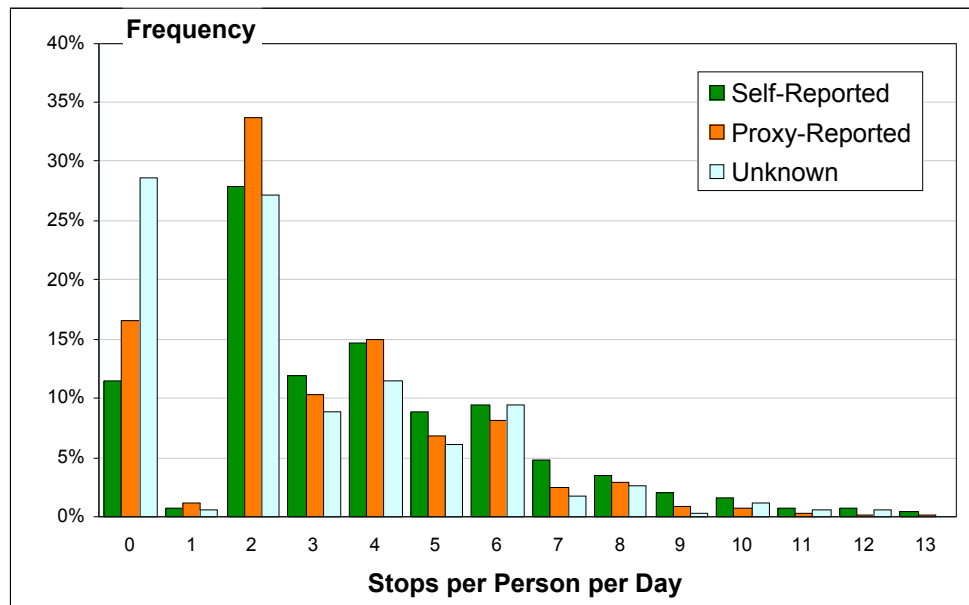
- Stops per day (where a Stop is a place at the end of a Trip Stage)
- Travel distance per day
- Travel time per day
- Stop rate differences by age and gender of respondent
- Stop rate differences by age and gender of completer

#### Stops per day

The summary statistics for Stops per person per day (for respondents aged 5 and more) are shown in Table 1, while the distributions of Stops per person per day for different types of reporting are shown in Figure 7.

**TABLE 1 Summary Statistics for Stop Rate for Different Reporting Types**

	Self-Reported	Proxy-Reported	Unknown	TOTAL
% Zero Stops	12%	17%	29%	14%
Stops per Person	3.82	3.10	2.81	3.55
Stops per Mobile	4.32	3.72	3.94	4.14
Sample Size	4491	1898	517	6906

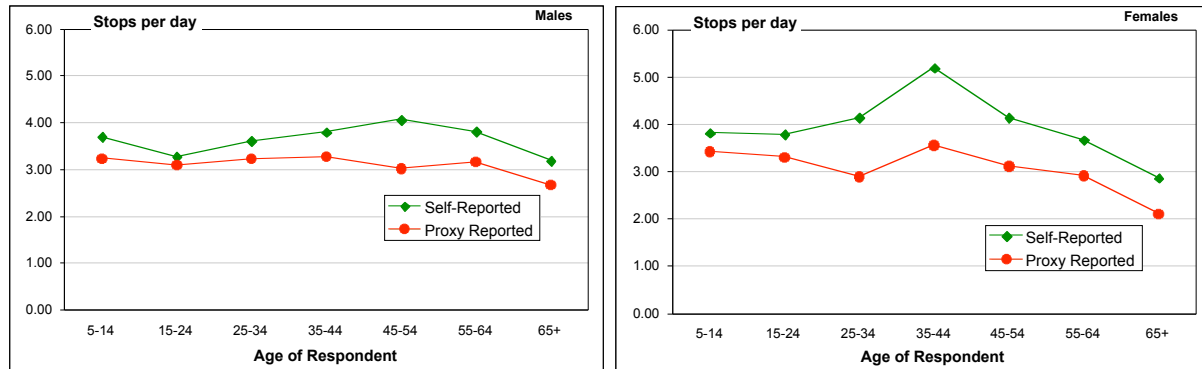
**FIGURE 7 Stops per Day for Different Reporting Types**

It can be seen that, as expected, Self-Reporting has a higher Stops per person per day and a lower percentage with zero Stops than Proxy-Reporting. Those with unknown reporting status have even lower Stops per person per day and a higher percentage with zero Stops than Proxy-Reporting.

Given the difference in survey methods, the results in Table 1 are surprisingly similar to those reported by Wargelin and Kostyniuk (7), who reported that proxy respondents reported 19% with no trips, compared to 12% for self-reported respondents, while the trip rate for proxy respondents was 13% lower than for self-reported respondents (cf 18% reduction in Stops in CSEQTS).

The results above, however, should be interpreted with some caution. The differences in Stop rates may be due to the different methods of reporting, but may also be due to the different types of people who self-report and proxy-report. For example, it has already been shown that young people are more likely to be proxy-reported. If they also have lower Stop rates, then this would automatically cause the Stop rate for proxy respondents to be lower than for self-reported respondents. We therefore need to examine the differences in Stop rate in more detail, taking account of demographic difference in proxy reporting.

Earlier, age and gender were found to be two main demographic variables that exhibited different rates of proxy reporting. Therefore, the proxy travel reporting will be examined after segmenting by age and gender of the proxy respondent. Figure 8 shows the self-reported and proxy-reported Stop Rates by age and gender of the respondent.

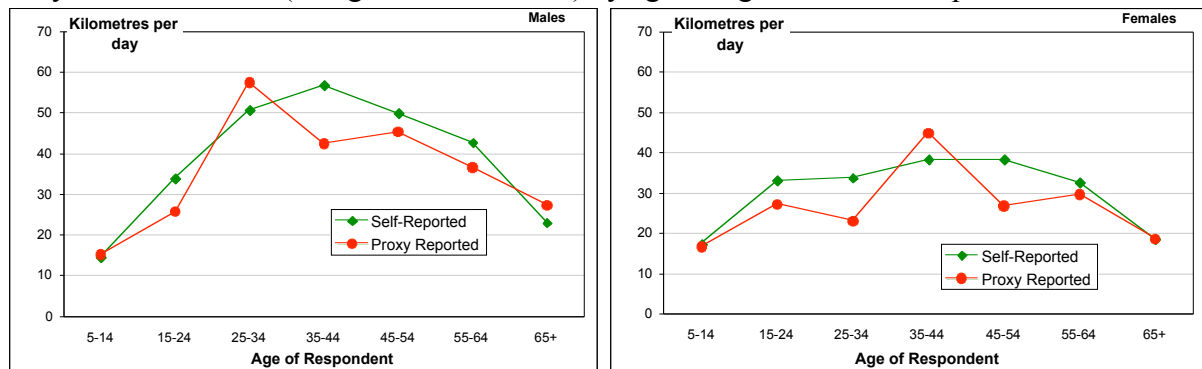


**FIGURE 8 Stops per Day for Different Reporting Types for Males and Females**

It can be seen that for all ages and genders, self-reported respondents have higher trip rates than proxy-reported respondents. On average, male proxy-reported stop rates are 14% lower than male self-reported stop rates, while female proxy-reported stop rates are 23% lower than female self-reported stop rates. That is, female stop rates are depressed more by proxy reporting than male stop rates. This is similar to results reported by Wargelin and Kostyniuk (7), who reported that male proxy respondents had a 10% reduction in trip rate, while female proxy respondents had a 15% reduction in trip rate.

### Travel distance per day

On the assumption that trips that are not reported by proxy respondents are more likely to be shorter incidental trips, it might be expected that the effect of proxy reporting on distance travelled might be less than on trips made. Figure 9 shows the self-reported and proxy-reported daily travel distances (straight-line distances) by age and gender of the respondent.



**FIGURE 9 Kilometres per Day for Different Reporting Types for Males and Females**

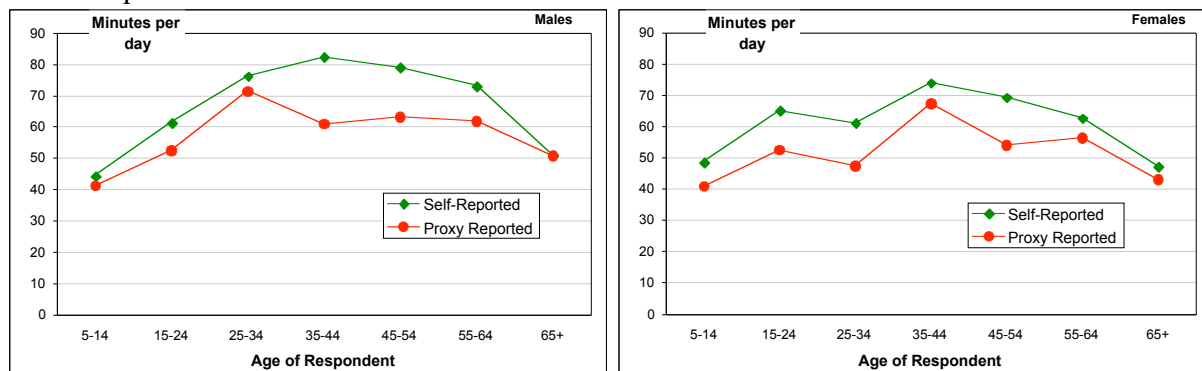
It can be seen that for most ages and genders, self-reported respondents have higher daily travel distances than proxy-reported respondents, although there are a couple of instances (males aged 25-34 and females aged 35-44) where the reverse is the case. While the two curves in Figure 9 appear visually closer than the corresponding curves in Figure 8, the differences in travel distance for the entire sample are greater than the differences in Stop Rates. On average, male proxy-reported travel distances are 19% lower than male self-reported travel distances,

while female proxy-reported travel distances are 26% lower than female self-reported travel distances. Thus it appears that proxy reporting has a greater effect on travel distance than it does on Stop Rates.

However, this is again an example of confounding due to the composition of the proxy respondents. There are many very young people in the proxy respondents and, as can be seen in Figure 9, younger people travel less distance in a day. This has the effect of automatically making the mean daily distance for proxy respondents lower than for self-reported respondents (which don't have many very young people) even if there were no effect of proxy reporting, itself, on reported daily travel distance.

### Travel time per day

The same reasoning applied to the reporting of daily distances can also be applied to daily travel time. Figure 10 shows the self-reported and proxy-reported daily travel time by age and gender of the respondent.



**FIGURE 10 Minutes per Day for Different Reporting Types for Males and Females**

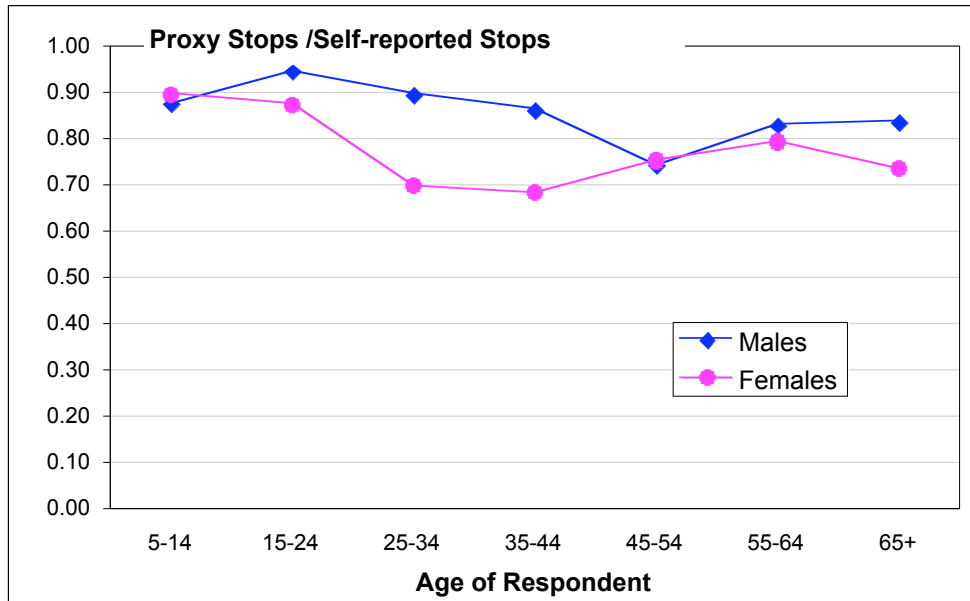
It can be seen that for all ages and genders, self-reported respondents have higher daily travel times than proxy-reported respondents. However, once again, while the two curves in Figure 10 appear visually closer than the corresponding curves in Figure 8, the differences in travel time for the entire sample are greater than the differences in Stop Rates. On average, male proxy-reported travel times are 20% lower than male self-reported travel times, while female proxy-reported travel times are 24% lower than female self-reported travel times. The same proviso, however, applies about confounding due to the high proportion of younger people in the proxy-respondents.

### Stop rate differences by age and gender of respondent

It was noted earlier that female stop rates are depressed more by proxy reporting than male stop rates. This can be shown graphically in Figure 11, where the ratio of proxy-reported Stops to self-reported Stops is shown for different ages and genders. It can be seen that, at virtually all ages, female Stop Rates are depressed more by proxy reporting than male Stop Rates. This is especially the case for women aged between 25 and 45. This mirrors the findings of Wargelin and Kostyniuk (7) who concluded that “the largest biases may be in the estimates of the travel of young and middle-aged adult women”.

The question naturally arises as to why female Stop Rates are depressed more by proxy-reporting than male Stop Rates. A clue to the possible answer lies in the findings shown earlier in

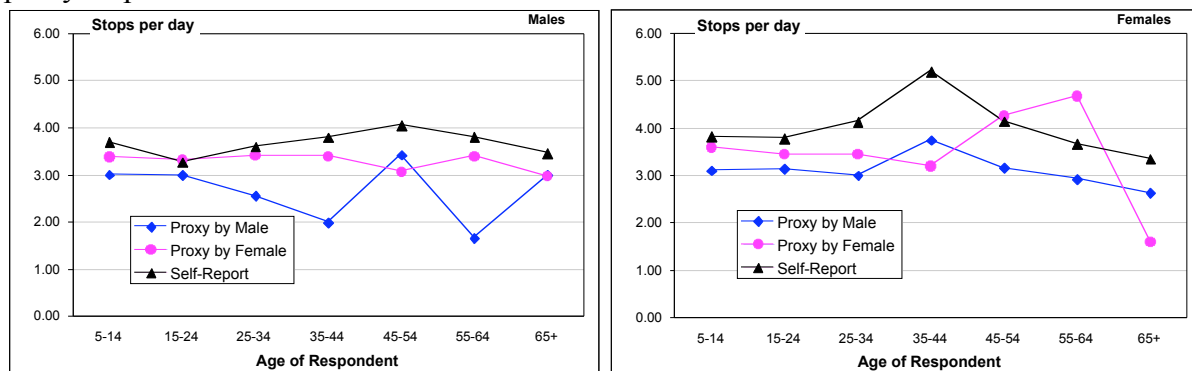
Figure 3, where it was shown that proxy responses for adults are most likely to have been provided by someone of the opposite sex, i.e. males complete the diary for females and females complete the diary for males (in about 90% of proxy respondent situations). Maybe the reason for the low female Stop Rates by proxy is because males are completing the survey forms!



**FIGURE 11 Ratio of Proxy-reported Stops to Self-reported Stops by Age and Gender**

**Stop rate differences by age and gender of completer**

This difference in performance for proxy travel reporting by persons of different gender can be explored by looking at the Stop Rates reported for male and female proxy respondents, when the completer is of the same or opposite sex. Figure 12 shows these results for male and female proxy respondents.



**FIGURE 12 Stops per Day for Proxy Reporting by Different Genders for Females**

It can be seen that in both cases, the proxy-reported Stop Rate is likely to be closer to the self-reported Stop Rate if the completer is a female. That is, females do a better job of reporting someone else’s travel than males. Since males are more likely, however, to do the proxy-reporting for females, this could explain why female proxy Stop Rates are lower than male proxy Stop Rates.

## CONCLUSION

This paper has examined the characteristics of proxy respondents and those completing the survey forms for proxy respondents in self-completed questionnaire Travel Dairy surveys. Using data from the Coastal South-East Queensland Travel Survey (CSEQTS), where a special question was included about who completed the Travel Diary, it was found that about 30% of respondents were proxy respondents. The young were more likely to be proxy respondents, while males of all ages were more likely to be proxy respondents than females of the same age. Females, especially those aged between 25 and 45, were most likely to be the ones who completed the Travel Diaries on behalf of others. Females were most likely to be the ones completing the Travel Diary for people under 35 years of age, while persons of the opposite sex were most likely to complete the forms for proxy respondents above 35. Those “keeping house” were least likely to be proxy respondents.

It was shown that proxy respondents were more likely not to make any trips on the Travel Day, and for those who did travel, they had fewer Stops, and less travel time and travel distance than those who self-reported their travel. However, and very importantly, one has to be very careful in interpreting these results because of the confounding effects of the demographics of proxy respondents versus self-reported respondents. In particular, it is known that younger people, who have fewer Stops and less travel time and distance, are much more likely to be proxy respondents. Therefore, the Stops, travel time and travel distance for proxy respondents will automatically be lower than for self-reported respondents (which don't have many very young people) even if there were no effect of proxy reporting, itself, on reported daily travel.

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