Environmental Education In The Workplace:

Inducing voluntary transport behaviour change to decrease single occupant vehicle trips by commuters into the Perth CBD.

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This thesis is presented for
the degree of Doctor of Philosophy of Murdoch University.

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Declaration

I declare that this thesis is my own account of my research and contains, as its main content, work that has not previously been submitted for a degree at any tertiary education institution.

Catherine Mary Baudains
List of Publications

Aspects of this thesis have been previously published in the following documents:


Baudains, C., Styles, I. and Dingle, P. (2001b) TravelSmart Workplace: Walking and the journey to work. Road and Transport Research, 10(1) 26-34. (Chapters 2 and 8)

Baudains, C. (2002) Evaluation of Three TravelSmart Workplace Interventions. A report of research conducted by Murdoch University for the Department of Environmental Protection. Department of Environmental Protection. Perth, Western Australia. (Chapters 4, 5, 8, 9 and 10)

Abstract

As populations increase and air quality continues to decline in many cities around the world, there is growing recognition that human dependency on car based transport is a serious pollution issue. The potential exists to change this aspect of human behaviour using environmental education to develop more sustainable transport practices. The application of education strategies to achieve behaviour change in transport mode choice may benefit from an interdisciplinary approach.

This research examined the effectiveness of three different educational strategies in a workplace situation in achieving a shift in transport mode away from the single occupant vehicle. This research aimed to determine if workplace based education interventions that stimulate a deeper level of learning, and encourage self-regulated learning and reflective practice, are more likely to achieve positive behaviour change than interventions based on more superficial learning. A secondary aim was to determine if the characteristics or type of workplace influence the effectiveness of particular education strategies. The research focuses specifically on people’s perceptions of transport behaviour and air pollution.

The research examined the effectiveness of three workplace based interventions which aimed at reducing the use of single occupant vehicles (SOV) for commuting to work resulting in an increase in the use of green transport (alternatives to the SOV). The primary goal of the three educational interventions was to achieve an increased awareness, development of positive attitudes and increased empowerment regarding sustainable transport choices. Based on a combination of environmental education
and self-regulation of learning theory it was theorized that achieving the three afore
mentioned educational outcomes would be highly likely to result in a change in
behaviour.

The three interventions differ in level of participant involvement, while the
information and structure of each intervention was controlled as much as is possible
in a naturalistic study. The intervention designs were based on educational theories
including cognitivist information processing, Vygotskian/social constructivism, and
self-regulation of learning. The first intervention provided information to participants
impersonally with no additional support. The second intervention incorporated a
volunteer to model pro-environmental behaviour, facilitate discussion of issues, and
aid in planning commute trips using alternatives to the single occupant vehicle. The
third intervention included the formation of a green transport planning group within
the workplace which aimed to identify and address barriers to using alternative
transport in the workplace through the development of a green transport plan.

In the naturalistic workplace setting, mixed methodologies (qualitative and
quantitative) were employed to examine the relative effectiveness of the three
interventions in terms of participants knowledge about, attitudes towards and
behaviour (action) in regard to transport, as well as changes at an organizational
level. Multiple case studies and surveys were used to collect data about employee
transport behaviour, attitudes, and knowledge in 13 workplaces situated in the central
area of Perth, the capital city of Western Australia, before and after a period of
intervention. To allow comparability between workplaces in terms of organisational
structure and function six of the 13 workplaces were selected to examine in detail,
one government and one engineering organization in each of the three intervention groups.

It was found that the level of knowledge about car use and air quality was increased in all three intervention groups, suggesting increased involvement does not improve the chance of increasing knowledge. In contrast, significantly more positive attitudes to car use and air quality issues were developed in only the two most involving interventions, suggesting information distribution alone is unlikely to influence attitude. There were no changes in the general environmental attitudes across the intervention groups. Single occupant vehicle trips were significantly reduced (p<0.05) in the second intervention group only. An overall significant increase was reported for self efficacy (as a measure of empowerment) but no significant change was reported for any particular intervention group. At an organizational level the third intervention resulted in the greatest organizational change, and it is likely that the measures implemented as a result of the green transport planning process will have an ongoing impact on employee transport behaviour in the participant workplaces.

The effectiveness of each intervention type also varied between workplaces. Structural factors such as design of the work environment, internal mail and email systems, and work hours influenced the delivery of the interventions in some workplaces and qualitative data indicates this may have influenced success. There was also an indication that management involvement and workplace culture were major factors influencing participant perceptions of effectiveness of particular education strategies.
Overall it is concluded that while the second intervention involving leadership (but without participant ownership) achieved the greatest reduction in use of the single occupant vehicle, the third intervention achieved the greatest long-term impact on participants and organizations. As a result the definition of effectiveness is complicated and is dependant on whether preferred outcomes have a short-term or a long-term focus. These findings have implications for the way in which achieving sustainable transport in metropolitan areas is approached, as well as other environmentally sustainable behaviours.
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Chapter 1
Introduction

Traditionally the study of behaviour has been the domain of psychologists and education researchers. However, in the new and evolving contexts of environmental behaviour research it is becoming a part of many other disciplines in order to address environmental behavioural issues such as those pertaining to transportation use, management, forecasting and the environment (Steg & Tertoolen, 1999). The nature of this research requires that a multidisciplinary approach be used. Aspects of both environmental sciences and education are incorporated into the design and implementation of this research in order to explore transportation issues from a human behaviour and learning perspective.

In today’s climate of environmental concern and uncertainty about the future, there is a great deal of incongruence between the way people interact with the environment, and the way they would prefer to interact with it (Australian Bureau of Statistics, 1996; Clarke, 1996). It is notable that while most people have positive environmental attitudes and are concerned about environmental issues, a much smaller proportion of people actually translate their concern to action (Arbuthnot, 1977; Costanzo, Archer, Aronson, & Pettigrew, 1986; Finger, 1994; Kuo, 1994). If the factors that influence whether an individual will take action or not can be identified, then they could be exploited to achieve a more environmentally sustainable society.
Many studies have tried different ways of changing the knowledge, attitude, and behaviour of individuals (Aggleton, 1997; Cook & Berrenberg, 1981; EPA, 1995; Lee & Balchin, 1995; Siero, Bakker, Dekker, & VanDenBurg, 1996; Whelan, 2001; Zelezny, 1999). These have ranged from didactic style methods which involve simply telling people, to reward based methods where the required behaviour can be rewarded either by tangible incentives or social praise. In more recent times social change theories have been developed that focus on levels of efficacy and self-regulation as important factors in determining a transition between positive attitudes and actions, yet there is little evidence of these theories being applied to achieve environmental outcomes.

Meanwhile, many environmental organisations, both government and non-government, spend considerable time and money trying to engender more environmentally sustainable behaviour. The educational strategies used for this range from the traditional information dissemination through printed material, to more involved strategies that require a higher level of learner participation. Theories of learning can be applied in these situations to explain variations in effectiveness. It is thought that self-regulation of learning theory and practice can be critical to success in achieving behavioural change - the desired outcome of learning. This can be applied to environmental education.

This research focuses on the effectiveness of workplace based education programs and the influence of self-regulation on employee transport behaviour in an environmental education context. Of particular interest is the motivation of adults as learners in their working environment, and the factors that influence a change in
behaviour. The education is provided through a Government program named TravelSmart Workplace, which aims to reduce single occupant vehicles and increase use of more sustainable transport. The participants are adults in a workplace setting, and the target behaviour is a reduction in car use for commuting. Three education strategies, information, leadership and involvement, are compared to determine which strategy has the most positive environmental education outcome.

1.1 Environmental education

Environmental education more often focuses on younger generations, neglecting the education of adults (NIACE, 1993). It is not surprising then, that knowledge of and concern about environmental issues have been reported as weaker among adults and particularly older adults than among young people (EPA, 1994; Walker, 1996). Shaw and Dingle (1998) suggest that this deficiency hampers the development and implementation of structures, behaviours and values that are advocated by environmentalists and world leaders in order to address current environmental issues. Furthermore, NIACE (1993) states that adults must change their behaviour and understanding as well if the efforts to educate young people are to have any credibility, and the public at large must be engaged in positive action to achieve environmental solutions if the environmental degradation that has taken place is to be reversed. This remains a challenge for environmental educators.

According to the United Nations the goal of environmental education is to develop a world population that is aware of and concerned about the environment and its associated problems, and which has skills, attitudes, motivations and commitment to work individually and collectively towards solutions of current problems and the
prevention of new ones (UNESCO-UNEP, 1976). Similarly, Fien (1988) reports that “The goal of environmental education is to produce environmentally literate citizens who will have a basic knowledge about and concern for the environment, awareness of issues, basic skills to cope with issues and initiate solutions, as well as motivation and commitment”.

If this goal is to be achieved it seems there is a great need for more and more effective environmental education. For example, a survey of 5057 year 10 students in Western Australia showed that while young people are concerned about the environment and intend to act in environmentally responsible ways, their knowledge of local environmental issues and their reported actual behaviour was very low (Baudains, 1998). This is not a unique situation with many similar cases reported in the literature (eg. Burn & Oskamp, 1986; Clarke, 1996; Dingle, 1997; Dunlap, 1991).

Environmental education has an important role to play in helping individuals to understand environmental issues, and make changes to their lives to achieve environmental benefits. Learning in this context can enable individuals to live in a way that more closely represents their positive environmental attitudes and fits more closely with their ideas about sustainable living. As a result environmental education can also influence positive environmental outcomes such as reducing air pollution by reducing private motor vehicle trips. In general, the overall aim of any environmental education program is to achieve positive behavioural outcomes, resulting in environmentally responsible behaviour, or environmental citizenship (Baudains & Dingle, 1998; Greenall-Gough, 1990; Ramsey, 1993).
So how can environmental education achieve the behavioural outcomes being sought? In general environmental education is thought of as a process rather than a presentation, challenging the unsustainable way in which human society currently exists. It is concerned with knowledge, feelings, attitudes, skills, and socialisation and encompasses education in, for, and about the environment, ideally a combination of all three. A transformation to a sustainable society must involve transformations in many areas including sociology, politics (institutional and general), economics, nature, and critical thinking (Greenall-Gough, 1993).

Lucas (1979) first described environmental education as encompassing a number of different classes of education, with the three independent or primary classes being education about the environment, education for (the preservation of) the environment, and education in the environment. The characteristics of these three classes have been thoroughly described in the literature and are outlined in the following discussion.

*Education about the environment* aims to provide information concerning the environment, and therefore has clearly cognitive objectives according to Bloom’s taxonomy (Bloom, 1956). Lucas (1979) explains that all the cognitive levels in Bloom’s taxonomy are relevant as learners may be expected to comprehend and interpret data, analyse situations, synthesise and evaluate environmental data and phenomena. According to Greenall-Gough (1993) in order for concern about the environment to be translated into appropriate behaviour patterns and actions to achieve an environmental goal, learners need to understand how natural systems work and what impact human activities have on them. This includes learning not
only about political, economic and socio-cultural factors, but also about the ecological factors that influence decisions about how to use the environment in the most responsible way. Knowledge about the environment is essential if all citizens are to participate in an informed debate aimed at resolving local, national and global environmental issues. Such knowledge can be gained from a variety of sources including formal education, media, personal experience and exposure to education campaigns or programs (Gilbert, 1996).

*Education in the environment* is characterized in the most basic sense by education ‘outside the classroom’. Education in the environment has been reported as aiming to develop individual value systems, self-reliance and personal aesthetic satisfaction (Roth & Helgeson, 1972). This is generally considered a pedagogic technique, rather than a goal. The goal in the environmental sense is developing a sense of value for the environment, and more importantly the skills and understanding of how to act in the best interest of the environment (Lucas, 1979). This class provides reality, relevance and practical experience for learners through experience in the environment (Greenall-Gough, 1993). Increased awareness of aspects of the environment can be expected to result from direct contact with the environment. Environmental awareness and concern can also be fostered by linking learning to direct experiences in the environment, and allowing learners to become captivated by the complexity and wonder of natural systems or immersed in the values conflict over particular environmental issues (Gilbert, 1996).

*Education for the environment* aims to assist the preservation or improvement of the environment, with typical programmes attempting to inculcate attitudes of concern
for the environment (Gilbert, 1996). Lucas (1979) suggests that in environmental education literature attitude generally refers to ‘a predisposition to act’. Lucas also states that since the goal of education for the environment is to produce a quality environment, citizens must be provided with the skills that are necessary to achieve this (Lucas, 1979). Both these characteristics suggest a behavioural goal. Education for the environment aims to promote a willingness and ability to adopt lifestyles that are compatible with the wise use of environmental resources. In so doing, it builds on education in and about the environment to help develop an environmental ethic and the motivation and skills necessary to participate in environmental improvement. The UNESCO-UNEP International Environmental Education Programme has stressed that environmental education needs to be based on a search for answers to a number of critical questions if it is to achieve what it considers important citizenship goals (UNESCO-UNEP, 1976). In contrast to education in and about the environment, education for the environment works towards the resolution of environmental questions and problems - what the World Commission on Environment and Development (1987, p 114) described as the ‘active involvement of students in the movement for a better environment’.

These three classes of environmental education are simplistically summarised by Lucas (1979) as:

- Education about the environment = Knowledge
- Education for (preservation of) the environment = Attitudes (motivation to act)
- Education in the environment = Actions (skills)
Lucas (1979) outlines a cyclic model (figure 1.1.1) which links the outcomes of the three classes of environmental education, and identifies assumptions concerning the relationships of knowledge, attitudes and actions that underlie environmental education programmes. In this model it is expected that participation in environmental activities “will influence attitudes and increase knowledge. The changed attitude and increased knowledge are then assumed to generate new activities, directed towards related goals, or more effective versions of the original actions” (Lucas, 1979 p74).

**Figure 1.1.1** Cyclic model of environmental education.

This effective way of considering the environmental education process, when viewed from an educational psychology perspective, lacks an explanation of the importance of metacognition, reflection and orchestration. The cyclic model does not provide a space for learners to combine the three aspects of their learning, reflect on them objectively and subjectively, and form new directions to continue their own environmental education.

### 1.2 Self-Regulation of Learning

One theory of learning that does focus on these characteristics is self-regulation of learning. Self-regulation of learning (SRL) has been the focus of much educational
research, and has been used to describe and explain approaches to learning from many different theoretical perspectives (Radloff, 1997). As a result, in defining SRL it is easier to describe the attributes of self-regulated learners (Zimmerman, 1994). Zimmerman (1986, p307) reports that “in contemporary terms students can be described as self-regulated learners to the degree that they are metacognitively, motivationally, and behaviourally active participants in their own learning process”. In examining and synthesising the broad range of literature on SRL, Radloff (1997) presented a model that highlighted not only these three aspects of SRL, but also the interaction and connections between them. Radloff’s model (figure 1.2.1) highlights the links between motivation, behaviour and metacognition, and the central role which metacognition plays in terms of knowledge, awareness and orchestration, and in overseeing other aspects of SRL. Metacognition refers to awareness and knowledge of goals, beliefs and strategies as well as their orchestration through planning, monitoring and evaluating (Radloff, 1997). The model recognises that the process of self-regulation may lead to changes in goals, beliefs and strategies, and it also recognises the overarching importance of affect which pervades all aspects of SRL.

Radloff explains the process of SRL as moving from values through motivation expressed as learning goals leading to learning engagements and resulting in learning outcomes (Radloff, 1997). Goals, beliefs and strategies can be viewed as learner attributes and are assumed to interact, changing over time in response to educator, peer and task influences, and affecting learning while also being affected by learning outcomes. Beliefs about self and task influence both goals and learning engagements, and learning engagements result in learning outcomes. Learning outcomes affect future learning goals through changes in beliefs about self and task.
Metacognition plays a pivotal role in the process through awareness and knowledge of goals, beliefs and learning strategies, through orchestration of learning and adaptive strategies and through evaluation and reflection of goals, strategies and learning outcomes (Radloff, 1997).

Figure 1.2.1 Model of self-regulation of learning.

The three characteristic goals/outcomes of the independent classes of environmental education described by Lucas (1979) can be interpreted as closely related to self-regulation of learning theory. Self-regulated learners would think actively about what they are learning (knowledge), why they are learning it (attitude), and how they are going to achieve the outcome (action), and this metacognition would result in developments in learning engagements (both cognitive and affective), reflection on the outcomes would result in further goal setting (action) and the process would continue. Each of the three primary classes of environmental education have a link to the aspects of SRL. For example:
The way in which self-regulation of learning theory so closely relates to the evolved theory of environmental education has implications for the importance of developing self-regulation in participants in order to effectively achieve environmental education goals. The clear links between the well known ‘in, for and about’ theoretical perspective on environmental education derived from the Lucas (1979) definition and the components of self-regulation of learning can be conceptualised by building the three classes of environmental education into Radloff’s (1997) model of SRL as illustrated in figure 1.2.2.

Figure 1.2.2  Model of SRL as pertaining to environmental education.

Gagliardi and Alfthan (1994) suggest that environmental education should be seen as a life-long process, which is also supported by educational theory – with learning being considered a life-long process not restricted to formal education (Biggs &
Moore, 1993). As a ‘tool for sustainable development’ (AAEE, 1994) environmental education programs which make use of sound educational theory have the potential to positively impact serious environmental problems facing society, such as air pollution from motor vehicles.

1.3 Air Pollution and Transport Trends in Perth

Air pollution occurs when the air contains gases, dust, fumes or odour in amounts that could be harmful to the health or comfort of humans and animals or could cause damage to plants or materials. The substances forming air pollution (pollutants) may be released into the atmosphere directly (primary pollutants), or may arise from chemical reactions between primary pollutants resulting in secondary pollutants (Department of Environmental Protection, 1997).

Air pollution in Australian cities has long been a concern. While current levels of visual and measurable air pollution are not as severe as in other international cities, the growth rate in vehicle use and emission rates are becoming an increasing focus for Australian governments with the growing number of photochemical smog events.

In Perth, the photochemical smog occurs during the warmer months of each year, and is caused by urban air pollutants, principally nitrogen oxides and reactive organic compounds, reacting together with sunlight and high temperatures to form high concentrations of ozone (O₃). Annual summer photochemical smog levels have on average exceeded WHO guidelines on 10 days per year between 1992 and 1995, and the number of days is increasing (Department of Environmental Protection, 1996). On average, motor vehicles annually contribute 51% of the total nitrogen
oxides and 44% of the reactive organic compound emissions that form photochemical smog in Perth (Select Committee, 1997). A large proportion of the trips that produce these emissions are related to the daily commute trip of the 80,000 people who are employed in the Perth Central Business District (Transport, 1995).

There are many ways to approach environmental problems such as these including policy development, infrastructure, legal regulation of behaviour, provision of incentives, and voluntary behaviour change programs. The most sensible approach to an environmental issue such as air pollution may be to integrate efforts in all of these areas. One approach, which is often encouraged but not always evaluated for effectiveness, is that of encouraging voluntary behaviour change through environmental education.

With the large number of trips into Perth resulting from commuters, behaviour change is required to achieve a significant reduction in motor vehicle emissions. Baseline studies indicate that 26% of Perth commuters have contemplated changing transport modes (Marshall, 1996). Some 10-20% of Perth’s commuters do not face major barriers to transport change for example: public transport is available; end of trip facilities such as showers are available; or home is within walking or cycling distance to work (Curtis & James, 1998; Marshall, 1996). Rather they drive simply out of habit or a misunderstanding of time or convenience issues. For many people in this group (those living close to work, those with good access to public transport nodes, etc.), travel alternatives may be quicker, more convenient, safer, healthier and cheaper (Marshall, 1996). Individualised marketing approaches could target these positive messages to this group of commuters.
1.4 Background to the Research  (History of TravelSmart Workplace)

In 1996 and 1997 the Department of Environmental Protection (DEP) and the Department of Transport implemented a trial information campaign aimed at ‘contemplaters’ that they named ‘TravelSmart’. The trial showed that a 10% change in sample behaviour could be achieved. In 1998 the Community Support Branch of the DEP was awarded funding through the Air Quality Management Plan to continue work in this area. The current program, TravelSmart Workplace, is specifically targeted at workplaces in the Perth Central Business District, and has been altered significantly from the original trial.

This research compares three workplace interventions that attempt to induce voluntary behaviour change. The series of interventions were run as the TravelSmart Workplace program for the Department of Environmental Protection over 1999 and 2000.

1.5 Research Questions

This research aims to examine the hypothesis that workplace education programs that stimulate a deeper level of learning through involvement and empowerment are more likely to achieve positive, long-term behaviour change. The specific behaviour forming the focus of the research is the transport mode choice of Perth commuters, with the target behaviour being a decrease in the use of the single occupant vehicle (SOV). In addition, the research will include a clarification of the relationships between the dependent variables of attitude, knowledge, self-efficacy (as a measure of empowerment) and behaviour using modern latent trait theory.
The main research question is:

What is the most effective educational strategy to use in a workplace situation to induce voluntary commuter behaviour change to more environmentally sustainable transport modes?

This question can be broken down into three main focus questions, which each can be further broken down to outline the various aspects of the research. These are presented below.

1. Which education intervention strategy of information, leadership or involvement, is most successful?

   1.1. Which educational strategy has the greatest impact on participants? In what ways do different educational interventions influence participants?

   1.1.1. Does greater participant involvement lead to greater knowledge?

   1.1.2. Does greater participant involvement lead to more positive attitude?

   1.1.3. Does greater participant involvement lead to greater sense of empowerment (as measured by self-efficacy)?

   1.1.4. Does greater involvement lead to greater SOV trip reduction?

1.2. Which educational strategy has the greatest impact on workplaces?

   1.2.1. Does greater involvement lead to more significant, long-term organisational change?

   1.2.2. Which intervention is perceived most positively by participants?

   1.2.3. What factors influence transport behaviour in a workplace?

   1.2.4. Why does a change in transport behaviour occur or not occur in a workplace?
2. Do workplace characteristics influence intervention success?

2.1. Is there a difference in the knowledge, attitude, empowerment or behaviour of participants from different types of workplaces?

2.2. What characteristics of a workplace influence the effectiveness of a particular educational strategy?

2.3. What workplace characteristics affect employee behavioural change?

1.6 Structure of Thesis

The following chapters will lead the reader through the background information essential to a complete understanding of the research, describe the conceptual framework and methodology of the research, and present then discuss the main findings of the research.

In Chapter 2, the background to transport and the environment in Perth is examined, specifically considering air quality and motor vehicle emission trends. The characteristics and implications of car dependency are explored, and a review of alternatives to the single occupant vehicle is provided. The reasons behind the choice to drive alone are examined and existing approaches to reducing air pollution from motor vehicles are summarised, specifically highlighting travel demand management (TDM).

Chapter 3 provides a summary and review of TDM programs around the world. A comparison of the features and strategies involved with the range of existing programs allows a clearer picture of the importance of examining such efforts from
an educational perspective. Program strategies are identified and reasons for success or failure are outlined using evaluation results reported in the literature.

Chapter 4 addresses the psychological perspectives involved in travel behaviour research. Context is provided for the use of terms such as attitude, knowledge, behaviour, empowerment and self-efficacy. Key learning theories are examined in the context of application in environmental education for behaviour change, with particular focus on the application of self-regulation of learning theory for adult learners in a workplace situation. Behaviour at the workplace level is also examined from an organisational theory perspective with a particular focus on organisational culture and an organisation’s defining characteristics.

Chapter 5 develops the conceptual framework for the research, showing how the various theories discussed in previous chapters are incorporated into this research, and presents the theoretical relationship between the variables. This chapter also describes the various aspects of the methodology such as the research design (eg. treatment types, quantitative and qualitative variables, data collection methods), development of questionnaire scales (knowledge, attitude, behaviour, self efficacy), participants in the research (workplace employees, environmental leaders/facilitators, researcher), research procedures, interventions, and analysis methods.

The validation of the instrument used for measurement of psychological constructs is presented in chapter 6. Each of the four scales measuring attitude, knowledge, environmental behaviour, and efficacy are examined for validity and reliability, in addition to an initial examination of the four scales combined. The details of
RUMM (Rasch Unidimensional Models for Measurement) analysis, reliability indices and fit of items in each scale are examined and presented.

Chapter 7 details the demographic composition of the samples, and describes the pre intervention levels of measured variables. This baseline data is provided in order to provide a clear profile of the workplaces and their participants prior to the implementation of educational intervention, and may be used to clarify the results of the research.

The results of the research are presented in three chapters. The first chapter (chapter 8) presents the results of the measured psychological variables and the levels of trip reduction. A brief examination of the types of behaviour change reported is provided. A summary of participant perception of intervention effectiveness is presented followed by the results of the survey questions pertaining to evaluation of the intervention tools.

Chapter 9 presents the qualitative results of organisational change. A review of the organisational characteristics and their impact on intervention effectiveness is presented, followed by a summary of case notes for each participant workplace. A summary of the changes achieved in organisations within each intervention group is then presented.

The final results chapter (chapter 10) presents an analysis of the motivations for and barriers to transport behaviour change. Each of these three chapters is concluded with a summary of the main findings of the chapter.
Finally, chapter 11 provides a discussion of the qualitative and quantitative research findings in relation to the research questions. Key issues arising from the results are considered and discussed in the context of relevant educational theory. Through this discussion, conclusions are drawn regarding the implications of the findings, and speculation on the broader issues is presented.
Chapter 2
Transport and the Environment

Human dependence on cars for transport has directly resulted in the emergence of issues such as air pollution, health risks and other car related problems such as infrastructure costs and social isolation (Engwicht, 1993). The seriousness of the impact of these issues has led to a need to focus on changing transport behaviour. This chapter identifies and examines the issues and research related to transport and the environment with the aim of providing the context and background to this research. First, the major car related problems and car dependency are discussed. Second, commuter behaviour and alternative transports are outlined, and lastly different approaches to changing transport behaviour are presented.

2.1 Air Quality and Motor Vehicle Emissions

In recent times air pollution in Perth and one of its main causes, traffic congestion due to motor vehicle dependency, have become the focus of much attention by the Western Australian Government (Transport, 1995). The State Government’s response to the Select Committee on Perth’s Air Quality (1998) recognised the need for co-ordinated action across a number of government agencies and the community to avoid a continuing decline in air quality (Government of Western Australia, 1998). Air pollution is becoming a serious issue in Perth (Department of Environmental Protection, 2000b). In summer the city suffers high levels of photochemical smog, and in winter high levels of haze are common. Photochemical smog is considered
one of the most significant problems facing many cities in the world. It is characterised by high concentrations of ground level ozone. Ozone is formed when oxides of nitrogen (NOx) and reactive organic compounds (ROCs) react together under the influence of sunlight (Department of Environmental Protection, 1997). One of the sources of the reactants forming photochemical smog is motor vehicle emissions (figure 2.1.1).

Perth, despite being a relatively small city by international standards with an estimated daytime population of 100 000 (City of Perth, 2001), is heavily car dependent. Census figures indicate that on average trips in private or company cars represent 75% of all commute trips made in Perth, with a quarter of these being 30 minutes to an hour in duration (see table 2.1.1) (Australian Bureau of Statistics, 1995). The work trip is the longest journey made by individuals on a regular basis and occurs predominantly in the peak period, thus creating the greatest pressure on the urban environment (Transport, 1995). This level of car dependency has a range of impacts on social, economic, environmental and health aspects of life in urban areas (Newman & Kenworthy, 1999; Steer Davies Gleave, 2000).

<table>
<thead>
<tr>
<th>Duration of work trip</th>
<th>Proportion of commuters</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Public Transport</td>
</tr>
<tr>
<td>&lt; 20 minutes</td>
<td>6.0%</td>
</tr>
<tr>
<td>20 to 29 minutes</td>
<td>11.0%</td>
</tr>
<tr>
<td>30 to 59 minutes</td>
<td>68.0%</td>
</tr>
<tr>
<td>&gt; 59 minutes</td>
<td>15.0%</td>
</tr>
</tbody>
</table>

Dora (1999) argues that travel - how, where, and how often we do it - has major implications for the health of individuals and of the population. Transport activities impact on health, both negatively and positively; and transport policies have important health consequences through their effects on air pollution, noise, injuries, climatic change, and their ability to create (or not) safe conditions for walking and cycling. These health consequences affect most of the population, not just transport users (Dora, 1999). Recent medical research has concluded that high pollution days in Perth can be linked to increased admissions to hospital for people suffering respiratory problems (Department of Environmental Protection, 2000a). Positive associations are being found between mortality from respiratory and other diseases and the estimated concentration of several air pollutants, and attendance of children with asthma at hospital emergency departments and Airborne Particulate Index (Peach, 1997). As motor vehicles contribute as much as 50% of the reactive organic compounds (ROCs) and nitrogen oxides (NOx) causing Perth’s photochemical smog (figure 2.1.1) reduction in these emissions is an important focus (Department of Environmental Protection, 1996).

**Figure 2.1.1** Percentage contribution of various sources of nitrogen oxides (NOx) and reactive organic compounds (ROCs) the main constituents of photochemical smog in Perth.

(Department of Environmental Protection, 1997).
2.2 Car dependency – a worldwide problem

Perth is not alone in facing the challenge to reduce motor vehicle use. Traffic levels in the United Kingdom are forecast to increase by up to 142% over the next two decades, leading to increased problems of congestion and environmental degradation (Cullinane, 1991). In the United States traffic congestion in urban, as well as suburban areas has continued to increase steadily despite substantial increases in federal, state and local spending aimed at reducing motor vehicle use (Nozick, Borderas, & Meyburg, 1998).

Research by Kenworthy et al. (1997) has shown that growing levels of car dependency are a large scale problem internationally. Their research also indicates issues relating to planning, understanding of transportation problems and social values have contributed to the growth of automobile dependence. The legacy of this growth includes suburban sprawl, smog and greenhouse emissions, energy costs, decreased road safety, deterioration in public spaces, social inequity, isolation and loneliness and the highly probable prediction of a future mobility crisis (Newman, Kenworthy, & Robinson, 1992).

Once a city is dominated by the car and large stretches of road, it is difficult for governments to exert any notable control over land use patterns and transportation choice. Often its transit system is unable to operate efficiently due to lack of infrastructure complicated by the city design (Newman & Kenworthy, 1999). A cycle can develop where planning and policy decisions supporting car use and road building as immediate solutions to congestion are made, while the long term issues
of air pollution, environmental degradation and health issues are left to deal with later. Figure 2.2.1 below demonstrates the inter-linkage of transportation, economics and cultural priorities in creating automobile dependent cities.

**Figure 2.2.1** Creating automobile cities.

![Diagram showing transportation, economic, and cultural priorities](source)

This cycle of increasing dependence on cars for transport has led to negative environmental, social and economic impacts, which are discussed below (Newman & Kenworthy, 1999; Steer Davies Gleave, 2000).

**Social and Access issues**

Increasing dependence on the motor vehicle has implications for social and access issues. A high focus on car based transport can exacerbate immobility and isolation in minority groups with no access to cars such as the disabled, the elderly, and the financially disadvantaged. Suburban design which does not encourage pedestrian and cyclist activity can result in inactive communities, high crime, and a lack of neighborhood communication (Newman *et al.*, 1992; Steer Davies Gleave, 2000).
Economic issues

In the past transport planners, engineers and economists have based their work on the assumption that there is a close link between mobility and wealth, which has led to a reticence in decision-making bodies to manage growth in car use, hence exacerbating the development of automobile dependence (Newman & Kenworthy, 1999; Rainbow & Tan, 1993). The costs of maintaining a sprawling road network are high in both environmental and financial contexts. The cost for the individual of maintaining a car is also often higher than the costs of using greener modes of transport. Work by Newman and Kenworthy (1999) have suggested that countries with a good public transport system have a higher gross regional product (GRP) because less money needs to be allocated to the spin-off issues which face a car dependent society.

Kenworthy et al. (1997) argue that after a certain point the negative economic effects associated with car use growth and low density suburban sprawl drain cities of wealth compared to cities with more balanced transport systems and less dispersed urban land use. The collected data on associated transport and land use patterns as well as direct costs (road expenditure, % GRP spent on commuting, transit cost recovery, time spent commuting) and indirect costs (transport deaths and transport emissions) confirmed that per capita wealth (GRP) in developed cities appears to diminish with car use growth (Kenworthy et al., 1997). Figure 2.2.2 shows the incongruent relationship between gross regional product (GRP) and car use (km/capita).
**Figure 2.2.2** Car use and gross regional product.

![Graph](image)

**Figure 3.9.** Car use per capita (VKT) in 1990 and wealth (GRP per capita in 1990 U.S. dollars).

Source: (Newman & Kenworthy, 1999) Sustainability and Cities, p 113

**Planning**

Planning is an important step in the incorporation of alternative transport into current city/suburban space. Government policy and politics play a large role in engendering value placed on the role of the car. Policies which seem to support road building and car use can encourage SOV travel in areas where it would be advantageous to reduce rather than increase it. Planning for future residential developments can take this into account and build into the design the infrastructure for a transit based community, or high density housing (Newman & Kenworthy, 1999). Urban villages that are high density residential areas focused around transit stops and are a common development in many European cities are an excellent example (Newman & Kenworthy, 1989).
2.3 Alternatives to the car

There are in fact sensible alternatives to using cars for transport, which in some cases can save the individual time and money and provide additional convenience as well as improve health and fitness by increasing physical activity. The ‘greener modes’ considered in this research are outlined below.

Carpooling

Carpooling can be defined as using one person’s car to carry one or more passengers to and from the same areas. For many commuters carpooling is both practical and possible as it is easy to organise, flexible and can be planned every day, or as little as one day each week, depending on the needs of the participants. Carpooling is considered the green transport option for those individuals who cannot, for whatever reason, go to work without their car. It is the optimum solution for those that need the car during the day for work or other commitments. If more people can travel in the same vehicle it increases the efficiency of the trip and therefore minimises environmental impact. One significant barrier to carpooling is the need to locate other people who are travelling to and from similar destinations. Carpooling matching programs at workplaces and on the internet are available in many areas internationally and can overcome this issue to a certain degree (Britton, 2000). The advantages and disadvantages of carpooling are shown in table 2.3.1 below.
### Table 2.3.1 Advantages and disadvantages of carpooling.

<table>
<thead>
<tr>
<th>Carpool Advantages</th>
<th>Carpool Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Shared responsibility, less driving time, reduced environmental impact</td>
<td>• Need to agree on ‘policies’ (smoking, departure time, cost or driving sharing),</td>
</tr>
<tr>
<td>• Convenience of door to door car travel</td>
<td>• Sometimes requires compromise</td>
</tr>
<tr>
<td>• Flexible</td>
<td>• Requires co-operation and tolerance</td>
</tr>
<tr>
<td>• Can reduce stress levels</td>
<td>• Need for punctuality</td>
</tr>
<tr>
<td>• Reduces the number of vehicles on the roads</td>
<td>• Driving skills of other carpool members</td>
</tr>
<tr>
<td>• Can reduce need for road maintenance</td>
<td>• Safety concerns for some individuals</td>
</tr>
<tr>
<td>• Reduces current transport costs (by up to 75%) by sharing with car pool members</td>
<td>• Finding a suitable partner/ group</td>
</tr>
<tr>
<td>• Practical if able to travel with family, friends or work colleagues</td>
<td>• Need to compromise on certain issues with carpool members</td>
</tr>
<tr>
<td>• Social, economic and health advantages have been recorded</td>
<td>• Travel time still influenced by traffic or traffic jams</td>
</tr>
<tr>
<td>• In some areas cheaper parking is made available for carpooling vehicles</td>
<td></td>
</tr>
<tr>
<td>• Choice of departure and arrival time</td>
<td></td>
</tr>
<tr>
<td>• Many web based ride matching services becoming available, especially in Europe</td>
<td></td>
</tr>
</tbody>
</table>

Sources: (City of Colorado Springs, 2003; Daniels, 1981; The Jack Bell Foundation, 2000; Transport, 1997)

**Public transport**

Public transport covers a wide range of transport options and can be an efficient method of transporting large numbers of people into and out of a city or other trip generator (Transport, 1999b). In areas where a service is provided the use of public transport such as train, bus or ferry is a popular and convenient commuting method. Using the public transport system is a relatively environmentally friendly way to travel. It offers a cleaner, more sustainable and safer alternative to private motor vehicles (Transport, 1999b). Reduced costs, less stress (not driving self), and increased time to read, relax, reflect or work are inherent advantages. Disadvantages
include the perception of public transport being for the ‘disadvantaged’, the perception of increased cost due to ‘pay as you go’ fares as opposed to the delayed cost of fuel, and the increased trip time in some situations where a direct public transport route is not available (Mackett & Edwards, 1998). Table 2.3.2 summarises some advantages and disadvantages of public transport.

Table 2.3.2 Advantages and disadvantages of public transport.

<table>
<thead>
<tr>
<th>Public Transport Advantages</th>
<th>Public Transport Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Information about public transport services is becoming easier to obtain with internet and phone info services</td>
<td>• Social perception that public transport is associated with the elderly, the young or the poor</td>
</tr>
<tr>
<td>• Support is often available to help determine the most efficient route for individuals</td>
<td>• Individuals need specific information about the services that suit them</td>
</tr>
<tr>
<td>• Some services offer discount for large numbers of trips purchased in advance, or annual commuting passes</td>
<td>• Cash out of pocket each day can result in the perception that public transport is costly</td>
</tr>
<tr>
<td>• Can provide time to take a nap, read or just relax and enjoy the scenery</td>
<td>• Must be able to get to a service route</td>
</tr>
<tr>
<td>• Clean fuel, low environmental impact</td>
<td>• Poorly maintained diesel buses are a source of particulate pollution</td>
</tr>
<tr>
<td>• Safer than using private car</td>
<td>• Perception that there is greater risk of physical harm on public transport.</td>
</tr>
</tbody>
</table>


Cycling

Cycling in some cities internationally has been the basis for transport for hundreds of years. In others however, it is considered a sport for the elite, or those with the right
'gear'. Cycling is becoming a popular recreation activity in Perth, but is still not generally considered as a form of transport for commuting (James, 1999).

Cycling in Perth is an important transport option. The city has a number of features that invite the use of a bicycle for getting to and from work including a good climate, flat terrain and an already extensive network of cycleways. Apart from car driver only trips, cycling is the only mode of transport experiencing an upward trend. Nevertheless, the Metropolitan Transport Strategy (MTS) has set a target for increasing the proportion of commuter trips made by cycle from 8% (under the current trend) to 11.5% by 2029 (Transport, 1995). It is interesting to note that the cycling target is the same as for the car passengers and 1% less than walking or public transport. These targets reflect the important role cycling plays in transport rather than being a marginal adult activity.

Cycling provides a health benefit for both the cyclist and the community. The cyclist obtains the type of exercise often difficult to achieve due to time pressures in today’s productivity demanding society. By reducing the risk of heart disease of participants, cycling has a positive effect upon community health system costs. The imposition of cycling upon the community is also low. The cost of providing infrastructure is much less than that required for the car, much less than the subsidy required for public transport and the requirement for emission regulation does not exist. Trip distance and perception of difficulty as well as lifestyle factors combine to result in a small proportion of commuters taking up cycling as an alternative to the single occupant vehicle. Table 2.3.3 summarises the commonly perceived advantages and disadvantages of cycling.
Table 2.3.3  Advantages and disadvantages of cycling for transport.

<table>
<thead>
<tr>
<th>Cycling Advantages</th>
<th>Cycling Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Energy efficient, no emissions or noise</td>
<td>• Need for adequate end of trip facilities</td>
</tr>
<tr>
<td>• Healthy</td>
<td>• Storage of bicycles</td>
</tr>
<tr>
<td>• Cheap</td>
<td>• Theft of bikes and gear</td>
</tr>
<tr>
<td>• Uses little road space</td>
<td>• Real or perceived danger of accident</td>
</tr>
<tr>
<td>• Avoids dealing with traffic jams</td>
<td>• Safety issues</td>
</tr>
<tr>
<td>• Door to door transport</td>
<td>• Limitation on what can be carried to and from work</td>
</tr>
<tr>
<td>• Refreshing</td>
<td></td>
</tr>
</tbody>
</table>


Walking

Engwicht (1993) explains that pedestrians were the original focus of transport and city design, and as a result cities were then easier to navigate on foot than any other form of transport. The nature of walking as a mode of transport is limited to those who can either incorporate it into their commute trip by mixing modes, or those who live close enough to walk to work in a reasonable time.

In Perth there are over 17,000 commuters (20%) who live within 5km from their workplace (Australian Bureau of Statistics, 1995; Transport, 2000b). Even if each of these people only walked to work two days every week, Perth’s air quality problems could be significantly reduced. Pedestrians could be considered the most environmentally friendly travellers because they require minimal infrastructure and virtually no equipment, and the advantages are mainly health based, as table 2.3.4 shows.
Table 2.3.4 Advantages and disadvantages of walking for transport.

<table>
<thead>
<tr>
<th>Advantages of walking</th>
<th>Disadvantages of walking</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Improved cardiovascular fitness</td>
<td>• Suitable only for short journeys</td>
</tr>
<tr>
<td>• Greatly reduced risk of heart disease and stroke</td>
<td>• Lack of end of trip facilities can make work uncomfortable</td>
</tr>
<tr>
<td>• Improved blood pressure and cholesterol</td>
<td>• Motivation can be a problem</td>
</tr>
<tr>
<td>• Reduced risk of developing diabetes</td>
<td>• Security issues</td>
</tr>
<tr>
<td>• Protection against arthritis</td>
<td>• Carrying materials</td>
</tr>
<tr>
<td>• Improved self-confidence</td>
<td>•</td>
</tr>
<tr>
<td>• Improved quality and ease of sleep</td>
<td>•</td>
</tr>
<tr>
<td>• Improved balance, gait and coordination</td>
<td>•</td>
</tr>
<tr>
<td>• Improved posture and appearance</td>
<td>•</td>
</tr>
<tr>
<td>• Enhanced mental health</td>
<td>•</td>
</tr>
<tr>
<td>• Improved muscle strength, joint movement, flexibility and balance</td>
<td>•</td>
</tr>
<tr>
<td>• Improved strength and fitness and a lower risk of osteoporosis</td>
<td>•</td>
</tr>
<tr>
<td>• Reduction in excess body fat and improved body tone</td>
<td>•</td>
</tr>
<tr>
<td>• Increased immune system</td>
<td>•</td>
</tr>
<tr>
<td>• Decreased risk of disease</td>
<td>•</td>
</tr>
</tbody>
</table>

Sources: (Alexander, 2001; Angley, 2001; Ashcroft, 2001; Dunn, 2001; Giles-Corti, 2001; Hillman, 2001; Ministry of Sport and Recreation, 1999; Ransom, 2001; Seaton, 2001; Transport, 2000a; Vernon, 2001)

**Teleworking**

Teleworking, or working from home, is a form of travel reduction which is growing in practicality and popularity (Hoejer, 1996). It is still, however, catering for a relatively small group of workers. With the growth of electronic communication teleworking has the potential to become a significant alternative to the single occupant vehicle commute trip, but it is not without disadvantages as summarised in table 2.3.5 (Hoejer, 1996; Mitchell, 1996; Transport, 1999a).
Table 2.3.5 Advantages and disadvantages of teleworking.

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Convenient</td>
<td>• Many workplaces will not accept</td>
</tr>
<tr>
<td>• No trip required</td>
<td>• Requires access to a home office</td>
</tr>
<tr>
<td>• Allows flexibility</td>
<td>• Can have negative effects from lack of contact with work colleagues</td>
</tr>
<tr>
<td>• More work time in the day therefore higher productivity</td>
<td>• Requires trust and self management of employees</td>
</tr>
<tr>
<td></td>
<td>• Reduced exercise</td>
</tr>
</tbody>
</table>

Sources: (Johnston & Pestel, 1996; Mitchell, 1996; Mokhtarian & Salomon, 1997; Nilles, 1996; Transport, 1997, 1999a)

2.4 Commuter Behaviour

Despite the available options the majority of commuters in Perth continue to choose the single occupant vehicle rather than using an alternative. Department of Transport figures show that 65% of the 85 000 Perth commuters drive to work each day, and almost 9 out of 10 cars entering and leaving the Perth central area have only one occupant (Transport, 2000b). In the United States it is reported that the proportion of drive alone commuting is around 70%, and 40% in the Netherlands (Emerson & Tansley, 1999).

Research by Marshall (1998b) indicates that 26% of Perth commuters have contemplated changing to a greener transport mode from the single occupant vehicle. According to Marshall (1998b) 10-20% percent of Perth’s commuters do not face major barriers to transport change such as a lack of available public transport, limited shower or change facilities at work for walking or cycling, or living outside suitable walking or cycling distance to work, and in most cases people drive simply out of habit or a misunderstanding of time or convenience issues. For many people in this
group (those living close to work or with good access to public transport) travel alternatives may be quicker, more convenient, safer, healthier and cheaper (Marshall, 1998b).

The Metropolitan Transport Strategy (MTS) advocates a better balance between the use of private motor vehicles and the alternatives of walking, cycling, public transport and teleworking (Transport, 1995). It recommends that 24.5% of all trips made by car will need to be redistributed to alternative modes as illustrated in figure 2.4.1, if Perth is to maintain reasonable mobility.

**Figure 2.4.1** Required trip redistribution from SOV to other modes.

![Graph showing trip redistribution](image)

Source: (Transport, 1995, p2)

There are many reasons examined in the literature that explain the repeated choice of the motor car as commuter transport, including difficulty of behaviour change, convenience associated with driving, lack of information about alternatives and the impact of driving, and the positive public/personal attitude towards cars. These are often referred to as dis-incentives or barriers to use of alternative transports and can be grouped into two main types: internal and external barriers. Internal barriers to the use of alternatives include those related to the affective components of a person’s
decision about transport mode such as perceptions and attitudes. Usually the individual can have an influence over those barriers. External barriers are those which make the use of alternatives physically difficult, and the individual may or may not have control over these factors, or control is judged as impossible or unrealistic.

McKenzie-Mohr & Smith (McKenzie-Mohr & Smith, 1999) document naturally occurring incentives and dis-incentives to use SOV and alternative transport. Tables 2.4.1 and 2.4.2 summarise this information. As can be seen from the tables, the reasons for using single occupant vehicles (SOVs) to commute seem to outweigh the reasons for using alternatives, in number and possibly in value.

Table 2.4.1 Common reasons for and against use of SOVs.

<table>
<thead>
<tr>
<th>Reasons for using a SOV</th>
<th>Reasons against using a SOV</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Shorter travel time (perception)</td>
<td>• Traffic congestion</td>
</tr>
<tr>
<td>• Prestige</td>
<td>• Fuel costs</td>
</tr>
<tr>
<td>• Flexibility of arrival &amp; departure time (perception)</td>
<td>• Maintenance costs</td>
</tr>
<tr>
<td>• Privacy</td>
<td>• Short trip distance</td>
</tr>
<tr>
<td>• Route selection/ Choice</td>
<td>E</td>
</tr>
<tr>
<td>• Cargo capacity</td>
<td>E</td>
</tr>
<tr>
<td>• Predictability (perception)</td>
<td>E</td>
</tr>
<tr>
<td>• Delayed costs</td>
<td>E</td>
</tr>
<tr>
<td>• Enjoyment of driving</td>
<td>I</td>
</tr>
</tbody>
</table>

E = external barrier  I = internal barrier
Table 2.4.2  Common reasons for and against use of alternatives to the SOV.

<table>
<thead>
<tr>
<th>Reasons for using alternatives</th>
<th>Reasons against using alternatives</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Making friends</td>
<td>• Exposure to weather</td>
</tr>
<tr>
<td>• Health and fitness</td>
<td>• Discomfort</td>
</tr>
<tr>
<td>• Time to read (public transport)</td>
<td>• Noise</td>
</tr>
<tr>
<td></td>
<td>• Dirt</td>
</tr>
<tr>
<td></td>
<td>• Surly personnel</td>
</tr>
<tr>
<td></td>
<td>• Long walks to stops</td>
</tr>
<tr>
<td></td>
<td>• Danger</td>
</tr>
<tr>
<td></td>
<td>• Immediate costs</td>
</tr>
<tr>
<td></td>
<td>• Unpredictability</td>
</tr>
<tr>
<td></td>
<td>• Small cargo capacity</td>
</tr>
<tr>
<td></td>
<td>• Limited route selection</td>
</tr>
<tr>
<td></td>
<td>• Crowds</td>
</tr>
<tr>
<td></td>
<td>• Limited time flexibility</td>
</tr>
<tr>
<td></td>
<td>• Low prestige</td>
</tr>
<tr>
<td></td>
<td>• Longer travel time</td>
</tr>
</tbody>
</table>

E = external factor  I = internal factor

Source: (McKenzie-Mohr & Smith, 1999)

External barriers or disincentives are open to perception by the individual. However, there are a number of ‘situation’ based factors that serve as an encouragement to use the car. As table 2.4.1 shows, these can include such things as trip distance, cargo capacity and comparative travel time. For individuals who live close to work these may not be as large a barrier as those who live 50km away from their destination. However many people do live too far from the workplace to cycle or use public transport (Kingham et al., 2000). Other external barriers may include physical disabilities that prevent cycling or walking or renders the individual dependent on others for transport. While generally external barriers are beyond the scope of
behaviour focused programs, a significant influence is possible through lobbying government bodies for improved infrastructure etc.

Internal barriers are more within the scope of behaviourally focused programs, yet are also invariably difficult to tackle. Factors such as a varying perception of difficulty, social status and acceptance of a problem significantly influence the choices individuals make. One of the main barriers is a perception that the alternatives are not viable (Kingham et al., 2000).

There are a number of social issues which have been observed to influence car dependency (Cutter, 1981; Tertoolen et al., 1998). The general acceptance of a ‘need’ to use cars for transport has developed a social mindset which allows individuals to ignore negative car related information. In regions of extreme car dependence the car becomes a symbol of independence, wealth, social status, and happiness. This results in motor vehicle transport becoming further entrenched and accepted by the social consciousness, so that it becomes even more difficult to plan non-motorised transport options. As Tertoolen et al. (1998, p171) explain:

"Car use provides the individual driver with a number of immediate advantages: it appears to be a cheap form of transportation; it creates feelings of freedom and independence; and it is efficient and convenient. However, it results in serious collective disadvantages, e.g. traffic congestion and traffic accidents, and in the long run heavy pollution leading to serious damage to the environment."

The concepts related to human perception, attitude and empowerment will be further discussed in chapter 4.
2.5 **Approaches to reducing air pollution from motor vehicles**

There are four main approaches that have been used to address the issues of air pollution and motor vehicle emissions: technical, land use planning and design, demand restraint, and changing behaviour; and the ideal situation would integrate strategies from each area (Gleave, 2001; Victoria Transport Policy Institute, 2002).

Each of these four approaches are outlined below.

1. **Technical approaches** can include new vehicle emission control technology, improvements of existing technology and decrease age of fleet, and use of alternative fuels. These have produced some excellent results in terms of emission reduction, however, have not contributed to a reduction in traffic congestion, or an overall reduction in emissions as it has been argued that the rapidly increasing fleet size counteracts the reductions in emissions. In addition, questions have been raised as to new types of emissions (Select Committee, 1997).

2. **Land use planning and design** approaches include improvement of infrastructure and improvement of services. This approach has proved to be one that requires time and the right political circumstances to achieve a beneficial change.

3. **Demand Restraint** includes restrictive parking regulations and law enforcement restricting vehicle use. There remains a consistent argument for the use of demand restraint type measures. Cullinane (1991) showed that demand restraint measures which hit people’s purses directly appeared likely
to meet with most success, but because of the level of attachment of many people to their cars, if real demand restraint is required, direct controls may be necessary.

4. **Changing behaviour** utilizes a range of Travel Demand Management strategies incorporating education and marketing. This fourth approach, encouraging individual behaviour change, is the focus of much current transport research, but is only beginning to become a major focus for governments and employers wishing to reduce car travel.

Transportation Demand Management (TDM) is a general term for strategies that result in more efficient use of transportation resources. While no adequate responses to control the growth of congestion have been identified, TDM has become a recognised policy option (Koppelman, Bhat, & Schofer, 1993; Nozick et al., 1998). Despite the recognition of TDM measures as a potential option, few methods have been suggested that can critically evaluate the improvements achieved through these measures at individual worksites or can isolate the effects of particular measures (Nozick et al., 1998).

Strategies employed in TDM can include distribution of information, reward or incentives for target behaviour and planning or development of more appropriate or beneficial infrastructure. Planning of initiatives specific to workplace situations is a more recent approach, often referred to as Green Transport Planning (GTP) (Emerson & Tansley, 1999). Chapter 3 examines behaviourally based TDM in more detail, considering existing TDM programs reported in the literature.
Chapter 3
Changing Transport Behaviour

A range of opinions exist concerning the benefits and drawbacks to using behaviourally based travel demand management strategies to alleviate environmental and social pressures on car based transport infrastructure. International travel demand management research and work suggests that it is possible to change the behaviour of single occupant vehicle (SOV) commuters using a range of marketing and educational approaches which target them with positive messages about alternatives to the SOV (Oborne & Levis, 1980; Steg & Tertoolen, 1999; Zelezny, 1999). Cullinane (1991) on the other hand concludes that although most people in the United Kingdom recognise the problems caused by traffic, they are unwilling to do much about it voluntarily.

Steg and Tertoolen (1999) argue that travel behaviour change programs can play an important part in working with individuals and communities to influence personal transport preference to incorporate greener modes of travel. Reductions in SOV travel reward not only the individual, but the environment and community which benefit by becoming more ‘livable’ (Engwicht, 1993; Newman et al., 1992). It appears that while the positive impact of a successful behaviour based travel demand management program is not in question, it remains uncertain which strategies and approaches are most effective.

Travel behaviour change programs are becoming more common around the world, strengthening efforts to reverse human dependence on the automobile. Analysis of
the literature reveals evidence of such programs dating as far back as the early 1970s (Kidder, Morgan, & Saltzman, 1976). Sources of literature on transport behaviour programs include journal articles, internet documents, research papers and technical reports spanning from 1975 to the present. The high number of programs in Europe complement the well established public transport systems and humanised cities (Newman et al., 1992). In many areas light rail is used extensively to travel to and from work with minimal environmental damage (Newman, 1994). Alternatives like walking and cycling are therefore more easily adopted (Newman, 2001) and programs are in turn more numerous and successful than those implemented in other regions with less infrastructure support. Perth's less intense land use, employment and population density, has meant adoption of alternatives and success of travel behaviour change programs can be more difficult than in European or American countries (Newman, 1994). In addition, it appears the problems arising from high level of car dependency have only recently become serious enough in Perth to find a place on the agenda of government and environmental educators.

Generally, travel behaviour change programs aim to raise awareness amongst the community about environmental problems associated with car use and to decrease the use of single occupant vehicles, in favour of alternatives. Table 3.1.1 summarises the main characteristics of a number of international programs which will be discussed in the next section. A more detailed version can be found in Appendix I.
Table 3.1.1  Summary of travel demand management programs.

<table>
<thead>
<tr>
<th>Program</th>
<th>Country</th>
<th>Commissioning body</th>
<th>Composition</th>
<th>Funds (Y=yes, N=no)</th>
<th>Time Frame (Years)</th>
<th>Target Area: w=work, M=metro, C=Community, CBD=central business district</th>
<th>Approach: 1=Incentive; 2=Information; 3=Leadership/social diffusion; 4=Involvement/GTP Evaluated</th>
<th>Success</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-2-3 Campaign Against Global Warming</td>
<td>USA</td>
<td>P</td>
<td>N</td>
<td>&lt;1</td>
<td>Com</td>
<td>3</td>
<td>Y</td>
<td>Y</td>
<td>(North, 2002)</td>
</tr>
<tr>
<td>ADONIS</td>
<td>Europe</td>
<td>*</td>
<td>Y</td>
<td>1.5</td>
<td>X</td>
<td>2</td>
<td>?</td>
<td>?</td>
<td>(CORDIS, 2000a)</td>
</tr>
<tr>
<td>Arizona Ordinance</td>
<td>USA</td>
<td>G</td>
<td>Y</td>
<td>3</td>
<td>W</td>
<td>2</td>
<td>Y</td>
<td>Y</td>
<td>(Modarres, 1993)</td>
</tr>
<tr>
<td>Boots Commuter</td>
<td>UK</td>
<td>P</td>
<td>Y</td>
<td>3</td>
<td>W</td>
<td>1</td>
<td>Y</td>
<td>Y</td>
<td>(Davidson, 2001)</td>
</tr>
<tr>
<td>Bus with Us</td>
<td>Canada</td>
<td>P</td>
<td>Y</td>
<td>22+</td>
<td>CBD</td>
<td>1</td>
<td>Y</td>
<td>Y</td>
<td>(Debats, 1981)</td>
</tr>
<tr>
<td>CAPTURE</td>
<td>Europe</td>
<td>*</td>
<td>Y</td>
<td>3</td>
<td>X</td>
<td>2</td>
<td>?</td>
<td>?</td>
<td>(CORDIS, 2000b)</td>
</tr>
<tr>
<td>Carpooling</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(Kidder et al., 1976)</td>
</tr>
<tr>
<td>Commute A Van</td>
<td>USA</td>
<td>P</td>
<td>Y</td>
<td>27+</td>
<td>W</td>
<td>1</td>
<td>Y</td>
<td>Y</td>
<td>(Debats, 1981)</td>
</tr>
<tr>
<td>Commuter Computer</td>
<td>USA</td>
<td>G</td>
<td>Y</td>
<td>26+</td>
<td>W</td>
<td>2</td>
<td>Y</td>
<td>Y</td>
<td>(Debats, 1981)</td>
</tr>
<tr>
<td>CONOCO Vanpool</td>
<td>USA</td>
<td>P</td>
<td>Y</td>
<td>25+</td>
<td>W</td>
<td>1&amp;2</td>
<td>Y</td>
<td>Y</td>
<td>(Debats, 1981)</td>
</tr>
<tr>
<td>Cycle 100</td>
<td>WA</td>
<td>G</td>
<td>Y</td>
<td>1</td>
<td>CBD</td>
<td>1</td>
<td>Y</td>
<td>Y</td>
<td>(Marshall, 1999)</td>
</tr>
<tr>
<td>Cycle Friendly Employers</td>
<td>England</td>
<td>G</td>
<td>Y</td>
<td>2</td>
<td>W</td>
<td>3</td>
<td>Y</td>
<td>Y</td>
<td>(Taylor, 1999)</td>
</tr>
<tr>
<td>Cycle to Work</td>
<td>WA</td>
<td>G</td>
<td>-</td>
<td>CBD</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td></td>
<td>(Transport, 1998; Wake, 1998)</td>
</tr>
<tr>
<td>EcoTeam Program Evaluation</td>
<td>Holland</td>
<td>P</td>
<td>Y</td>
<td>2</td>
<td>Com</td>
<td>2&amp;3</td>
<td>Y</td>
<td>Y</td>
<td>(Empowerment Institute, 2003; Harland, 1996)</td>
</tr>
<tr>
<td>Florida State University Carpooling</td>
<td>USA</td>
<td>G</td>
<td>Y</td>
<td>0.25</td>
<td>W</td>
<td>1</td>
<td>Y</td>
<td>Y</td>
<td>(Jacobs, Fairbanks, Poche, &amp; Bailey, 1982)</td>
</tr>
<tr>
<td>Go Green</td>
<td>Canada</td>
<td>G</td>
<td>Y</td>
<td>2</td>
<td>W</td>
<td>1&amp;2</td>
<td>Y</td>
<td>Y</td>
<td>(BEST, 2000; 2003)</td>
</tr>
<tr>
<td>Green Commuter Planning</td>
<td>UK</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(Emerson &amp; Tansley, 1999)</td>
</tr>
<tr>
<td>Headstart</td>
<td>UK</td>
<td>G</td>
<td>Y</td>
<td>3</td>
<td>W</td>
<td>2</td>
<td>Y</td>
<td>Y</td>
<td>(Ciaburro, Jones, &amp; Haigh, 1994; Jones, 1998)</td>
</tr>
<tr>
<td>ICARO</td>
<td>Multiple</td>
<td>*</td>
<td>Y</td>
<td>2.25</td>
<td>X</td>
<td>1&amp;2</td>
<td>Y</td>
<td>Y</td>
<td>(CORDIS, 2000d)</td>
</tr>
<tr>
<td>INPHORMM</td>
<td>Multiple</td>
<td>G</td>
<td>Y</td>
<td>3</td>
<td>Com</td>
<td>2</td>
<td>Y</td>
<td>Y</td>
<td>(European Commission, 2000b)</td>
</tr>
<tr>
<td>Issaquah EcoTeam Program Survey</td>
<td>USA</td>
<td>P</td>
<td>Y</td>
<td>5</td>
<td>Com</td>
<td>2 &amp; 3</td>
<td>Y</td>
<td>Y</td>
<td>(Global Action Plan, 2000)</td>
</tr>
<tr>
<td>Jack Bell carpool</td>
<td>Canada</td>
<td>P</td>
<td>Y</td>
<td>+</td>
<td>W</td>
<td>2</td>
<td>N</td>
<td>?</td>
<td>(Jack Bell Foundation, 2003)</td>
</tr>
<tr>
<td>Just Walk It</td>
<td>Australia</td>
<td>P</td>
<td>Y</td>
<td>1</td>
<td>M</td>
<td>4</td>
<td>Y</td>
<td>Y</td>
<td>(Foreman, Brookes, Abernethy, Brown, &amp; Stoneham, 2001)</td>
</tr>
<tr>
<td>Program</td>
<td>Country</td>
<td>Region</td>
<td>Yr</td>
<td>Com</td>
<td>M/M</td>
<td>1</td>
<td>Y</td>
<td>Y</td>
<td>Source/Year</td>
</tr>
<tr>
<td>--------------------------------------</td>
<td>-------------</td>
<td>-------------</td>
<td>----</td>
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<td>---</td>
<td>-------------------------------</td>
</tr>
<tr>
<td>Living Neighbourhood SA</td>
<td>Australia</td>
<td>G</td>
<td>&lt;1</td>
<td>Com</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(Steer Davies Gleave, 1999)</td>
</tr>
<tr>
<td>Managing Staff Trips</td>
<td>UK</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(Whitelegg, 2001)</td>
</tr>
<tr>
<td>MOMENTUM</td>
<td>Europe</td>
<td>*</td>
<td>3</td>
<td>X</td>
<td>2</td>
<td>Y</td>
<td>Y</td>
<td></td>
<td>(CORDIS, 2000e)</td>
</tr>
<tr>
<td>MOAIC</td>
<td>Europe</td>
<td>U</td>
<td>Y</td>
<td>3</td>
<td>Com</td>
<td></td>
<td></td>
<td></td>
<td>(European Commission, 2000a)</td>
</tr>
<tr>
<td>Off Ramp</td>
<td>Canada</td>
<td></td>
<td>G</td>
<td>Y</td>
<td>LT</td>
<td>X</td>
<td>2</td>
<td></td>
<td>(B.E.S.T., 2000)</td>
</tr>
<tr>
<td>Free Public Transit</td>
<td>USA</td>
<td>P</td>
<td>Y</td>
<td>&lt;1</td>
<td>M</td>
<td>1</td>
<td>Y</td>
<td>Y</td>
<td>(Bachman &amp; Katzev, 1982)</td>
</tr>
<tr>
<td>Reducing Gasoline Consumption</td>
<td>USA</td>
<td>P</td>
<td>Y</td>
<td>&lt;1</td>
<td>M</td>
<td>2</td>
<td>&amp; 3</td>
<td>Y</td>
<td>(Rothstein, 1980)</td>
</tr>
<tr>
<td>Research: Tertoolen</td>
<td>Holland</td>
<td>G</td>
<td>Y</td>
<td>.16</td>
<td>X</td>
<td>2</td>
<td>Y</td>
<td>N</td>
<td>(Tertoolen et al., 1998)</td>
</tr>
<tr>
<td>Ride Arranger</td>
<td>USA</td>
<td>G</td>
<td>Y</td>
<td>&lt;1</td>
<td>W</td>
<td>2</td>
<td></td>
<td></td>
<td>(DRCOG, 2000)</td>
</tr>
<tr>
<td>Shifting to Sustainable Modes of Transportation</td>
<td>USA</td>
<td>G</td>
<td>Y</td>
<td>&lt;1</td>
<td>M</td>
<td>1</td>
<td>&amp; 2</td>
<td>Y</td>
<td>(Whitson, 1994)</td>
</tr>
<tr>
<td>Simon Kingham</td>
<td>UK</td>
<td>G</td>
<td>Y</td>
<td>&lt;1</td>
<td>M</td>
<td>2</td>
<td>Y</td>
<td>Y</td>
<td>(Kingham et al., 2000)</td>
</tr>
<tr>
<td>Smogbuster Way to Work</td>
<td>Australia</td>
<td>G</td>
<td>Y</td>
<td>4+</td>
<td>CBD</td>
<td>1</td>
<td>&amp; 2</td>
<td>Y</td>
<td>(Wake, 1999)</td>
</tr>
<tr>
<td>STEPS</td>
<td>UK</td>
<td>G</td>
<td>Y</td>
<td>3</td>
<td>Com</td>
<td>1</td>
<td>Y</td>
<td>Y</td>
<td>(Nottingham County Council, 1999)</td>
</tr>
<tr>
<td>Suburban</td>
<td>Europe</td>
<td>*</td>
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<td></td>
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<td></td>
<td>(European Academy of the Urban Environment, 2001)</td>
</tr>
<tr>
<td>TAPESTRY</td>
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</tr>
<tr>
<td>Travel For Work</td>
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<td>G</td>
<td>Y</td>
<td>2</td>
<td>W</td>
<td>4</td>
<td>Y</td>
<td>Y</td>
<td>(Cambridgeshire County Council, 2000)</td>
</tr>
<tr>
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<td>G</td>
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<tr>
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<td>G</td>
<td>Y</td>
<td>&lt;1</td>
<td>Com</td>
<td>2</td>
<td>&amp; 3</td>
<td>Y</td>
<td>(Transport SA, 1998; 2000)</td>
</tr>
<tr>
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<td>G</td>
<td>Y</td>
<td>5+</td>
<td>Com</td>
<td>1</td>
<td>Y</td>
<td>Y</td>
<td>(James, 1999; John, 2001; Transport, 2000c)</td>
</tr>
<tr>
<td>TravelSmart Workplace Trial</td>
<td>WA</td>
<td>G</td>
<td>Y</td>
<td>3</td>
<td>CBD</td>
<td>2</td>
<td>Y</td>
<td>Y</td>
<td>(1998a; Marshall, 1998b)</td>
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<td>?</td>
<td>6+</td>
<td>CBD</td>
<td>1</td>
<td>&amp; 2</td>
<td>Y</td>
<td>(Sykes, 1998)</td>
</tr>
<tr>
<td>Turn it Off: Anti Idling</td>
<td>Canada</td>
<td></td>
<td>G</td>
<td>Y</td>
<td>&lt;1</td>
<td>M</td>
<td>2</td>
<td>&amp; 3</td>
<td>Y</td>
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<tr>
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<td>Europe</td>
<td>*</td>
<td>Y</td>
<td>2.5</td>
<td>X</td>
<td>1</td>
<td>&amp; 2</td>
<td>?</td>
<td>(CORDIS, 2000c)</td>
</tr>
<tr>
<td>Walking the way to health</td>
<td>UK</td>
<td>G</td>
<td>Y</td>
<td>&lt;1</td>
<td>Com</td>
<td>2</td>
<td>&amp; 3</td>
<td>Y</td>
<td>(Ashcroft, 2001)</td>
</tr>
<tr>
<td>Way To Go! School Program</td>
<td>Canada</td>
<td>P</td>
<td>Y</td>
<td>&lt;1</td>
<td>School</td>
<td>2</td>
<td>Y</td>
<td>Y</td>
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</table>

### 3.1 Characteristics of behaviour change programs

Examination of the behaviour change programs reported in travel demand management literature suggests some patterns in delivery and success of programs that aim to achieve a behavioural change. Comparison of the 50 programs summarised in table 3.1.1 reveals some major differences, some elements requiring
further investigation, and a number of commonalities. The characteristics that were common across a majority of the programs included geographical target area, funding, government involvement, evaluation, and marketing strategies. The major differences included the structure of the programs, evaluation criteria and definitions of success, and education strategies used.

In 13 of the 50 programs the targets were specifically commuters. Logically the programs focused on metropolitan and business districts, as this is where the main problems of congestion and heavy traffic pollution occur during peak times at the beginning and end of the business day. The objectives in these programs focused on reducing the number of trips made into city areas or moving commuters out of single occupant vehicles and into alternative modes of transport. A factor reported as influencing success in some of these workplace programs was the cultural disposition of the organisation. If participating organisations were sympathetic towards environmental outcomes the programs were more likely to be successful (Ciaburro et al., 1994; Hertfordshire County Council, 1994; South Cambridgeshire District Council, 2000). Organisational culture will be discussed in more detail in chapter 4.

A few programs however did focus on small communities, neighbourhoods and rural areas. The goals in these programs tended to be ‘safer streets’ or ‘reclaiming livable urban areas’, inducing a rebellion against the tyranny of the motor vehicle (Engwicht, 1993). The strategies employed in these cases were broader and in some cases immeasurable (Steer Davies Gleave, 2000). For example, as part of the six month ‘Living Neighbourhood’, project, the entire community of Dulwich and Rose...
Park in the City of Burnside South Australia, became a Living Neighbourhood. About 1500 people were invited to participate. The Living Neighbourhood approach is based on more than simply making people aware of transport issues. It incorporates the 'travel blending' method developed by Steer Davies Gleave, but also aims to achieve social objectives toward urban regeneration through community participation (Transport SA, 2000).

Another commonality was the existence of funding. The majority (77%) of the reported programs (table 3.1.1) required significant funding in order to achieve their goals. This was particularly true of the incentive based programs as the cost of purchasing items such as bicycles, vans, and public transport passes on a relatively large scale was high. Funding for the programs summarised in table 3.1.1 ranged from $10,000 to $500,000 dollars annually. Funding was highlighted as important to the success of the program in a number of cases (Debats, 1981; Modarres, 1993; Transport, 2000c). The Cambridgeshire County Council (2000) reported that commitment to allocate finances and support staff time to the project determines the success rate of change. The Arizona Travel Reduction Ordinance found that the more the employer spent on the employees, the more successful the program (Modarres, 1993). Seafirst had a high participant rate, involving 3,000 of its 7,500 staff utilising free bus passes and eliminating over 12 million employee driven miles annually which would not have been possible without considerable financial commitment (Debats, 1981).

Financial incentives tended to encourage a change in behaviour, as for the ‘Bus with Us’ and ‘Arizona Travel Reduction’ campaigns (Debats, 1981; Modarres, 1993).
Direct benefits from incentives such as the public transport passes used at STEPS (Nottingham County Council, 1999), and adjusted work hours and preferential parking for alternative mode users were reported as having the potential to increase green mode travel significantly in the ‘Arizona Travel Reduction’ ordinance, achieving an increase of 29% in alternative mode use (Modarres, 1993). The CONOCO vanpool program (Debats, 1981) which offered employees the chance to save money on individual car driving costs by taking part in a vanpool for a small fare every month showed that 93% of participants believed vanpooling was equally or more convenient than their previous mode and a further 30% planned to sell or not buy another car. This is considered to be a real achievement in terms of reaching beyond daily commuting to work, to affecting the employees’ personal lives in becoming more sustainable (Debats, 1981).

Government involvement was also common across the reported programs. Many of the programs were either commissioned or supported by government. This is a positive trend as it suggests recognition of car dependency as a problem, and a willingness to work towards solutions at a government level. This recognition at government level has positive implications not only for the continuing effort towards sustainable transport, but also for the perception of car dependency as a problem in the wider community. In addition, government support of TDM behaviour programs may allow a greater integration of human behaviour research with transport planning and infrastructure.

The majority of programs incorporated an evaluation to determine effectiveness and achievement of goals. While the methods varied in depth and focus, the use of
evaluation allows the development and improvement of strategies in practice. Programs which do not report evaluation results are not as useful for planning future TDM as it is unknown whether the strategies employed were successful or not. A majority of the programs reported success in changing behaviour, in some cases dramatically. Generally the criterion for evaluation was a survey of transport use in order to calculate reduction in trips, however in some programs such as Travelwise and Headstart the criteria was the development of a transport plan (Sykes, 1998), or the number of participants (Ciaburro et al., 1994).

Projects which had specific goals for SOV reduction tended to evaluate and monitor their progress to determine whether their targets had been met. This process of goal setting and evaluation is likely to have influenced the availability of literature on travel behaviour change programs, with few unsuccessful or un-evaluated programs being reported in the literature. It seems that while all the programs are trying to change behaviour, the focus is on counting the number of trips reduced rather than the process involved in the actual behaviour change and therefore exploration of the nature of and triggers for the behaviour change.

The time frame of successful projects, in terms of researching, implementation and monitoring was generally one year or longer. The only project documented as unsuccessful had a time frame of eight weeks and based its methodology solely on providing information (Tertoolen et al., 1998). Compared to other programs the Tertoolen et al. (1998) study had a relatively short duration, which did not allow for any significant discussion or engagement between the participants and the issues, or value development, a strategy considered important by a number of programs such as
Living Neighbourhoods (Steer Davies Gleave, 1999), TravelSmart South Perth (Transport, 2000c) or the Cambridge Travel for Work programs (South Cambridgeshire District Council, 2000).

In workplace based programs the size of the participating organization and clear support from management are reported as influencing success. These criteria for success were described by several programs including SmogBusters Way to Work (Wake, 1999). GO GREEN Choices was successful in creating a change in behaviour of 34% of its 545 employees due partly to the commitment from the workforce to decrease traffic congestion (GO GREEN Choices, 2000; BEST, 2000; 2003). In terms of organisation size ICARO suggested a minimum of 100 employees are needed for a successful carpool at a workplace, as a small workplace can make carpooling difficult and unsuccessful (CORDIS, 2000d).

A number of factors which created difficulties in achieving behavioural change, or which required further investigation were raised in the literature. Emerson and Tansley (1999) report that while the widespread adoption of Green Transport Plans (GTPs) by employers has become an important aim of the United Kingdom government as it tries to find ways of reducing transport demand, the tax treatment of employee benefits that form part of many green transport plans has been identified by the government and others as a barrier to their adoption. Based on telephone interviews with employers and meetings with tax and transport experts, Potter et al. (1999) confirms this perception, explaining how tax forms a barrier to GTP implementation and the potential solutions.
Unexpected response to travel demand reduction actions was an issue reported as requiring further investigation. In one study Tertoolen et al. (1998) found that TDM measures were unsuccessful in causing any change away from SOV due to participants claiming others were more guilty of ‘un-environmental’ behaviour than themselves, so they therefore need not alter their own behaviour. In another case, research examining the effectiveness of providing free bus rides found that rather than decreasing car use to increase bus rider-ship, walking tended to decrease in favour of using the bus (Everett, 1980; Isaacs, 1981). These situations where the chosen strategy either does not attract the target group, or results in a negative response are important to developing an understanding of the reasons why behaviour programs are effective or ineffective.

In the context of more general environmental behaviour the literature shows similar contradictions. The NSW Environmental Protection Authority found in relation to solutions to pollution that a collective responsibility was recognised by the community, but the need for strong regulations in setting legal and social expectations was endorsed (EPA, 1995). The government was seen as important in maintaining pollution regulations for business, and the need for education to increase awareness and individual responsibility was widely recognised (EPA, 1995). It appeared that there was awareness of the problem, but an unwillingness to take personal responsibility for it. This suggests a lack of empowerment amongst respondents concerning the pollution issue. The reported findings of the study further support this interpretation in that, if a change in behaviour had taken place the most important reason given by participants for this change was an acceptance of
responsibility for their actions (64%), followed by an increase in ease or convenience 47% (EPA, 1995).

A major difference between the programs summarised in table 3.1.1 is the approach or educational strategy used in trying to change the transport behaviour of participants. The educational strategies used in these programs can be simplistically grouped into four main categories:

1) Incentive or rewards;
2) Information distribution;
3) Individualised marketing, a combination of both 1 and 2 directed at the specific needs of the individual and involving personal contact; and
4) Green transport planning, which can involve the target audience in the barrier identification and decision making process.

These approaches or strategies can be linked with educational theories, which will be more closely examined in chapter 4.

Each of these four strategies as well as combinations of the four are reported in the programs summarised in table 3.1.1. The literature reports examples of successfully reducing single occupant vehicle use for each of these strategies, as well as criticisms of each approach. Studenmund and Connor (1982) reported that information and incentives must be offered in conjunction if a significant change out of car dependence is to be achieved. Ampt and Rose (2000) found that addressing individualised transport needs, utilising a range of alternatives such as transit, cycling, walking or pooling, encouraged a shift from SOV to greener modes. Brög (2001) suggests that information should reach participants personally and should be
tailored to their needs. Tertoolen et al. (1998) contradicts the success of such an individualised approach as participants were given information directed to their personal needs as well as information concerning the environment but no actual change in behaviour resulted. While many of the reported programs focus on providing incentives or information in order to induce behaviour change, there is a lack of focus on the ‘process’ of behaviour change, and how different strategies affect long term decision making and behaviour about transport choices.

Regardless of the chosen strategy, a major goal of all travel demand management programs is to change human behaviour (Victoria Transport Policy Institute, 2002). Changing any human behaviour draws heavily on current understandings of psychological and educational theory. Arbuthnot (1977) suggests the success of public policy decisions, educational programs, and other efforts dependent upon specific individual action in the realm of environmental issues may well hinge upon our understanding of the relationships among personality characteristics, attitudes, and environmental values, knowledge, and behaviours.

As outlined in table 3.1.1 there have been many programs designed and implemented that aim to reduce car use or car trips, especially in congested urban areas. These programs are generally commissioned due to a recognised problem such as severe or growing urban congestion, or air pollution issues. Many of the programs that have been compared have been evaluated, but this evaluation is limited to the design and implementation of programs as a product rather than a process, and does not tend to focus on individuals as learners and cognitive decision makers. The criterion for success is often number of trips, or overt behaviour rather than the more intrinsic...
properties and changes within the individual as a decision maker. This limits the scope of such studies as they cannot explore or explain the potential effectiveness of changes within the individual which might have ongoing broader social implications, as might be expected in a program which is essentially aiming to achieve large scale social change such as overcoming car dependency. The key element of long term behaviour change is often overlooked as it is difficult to measure and requires additional qualitative data.

Many approaches, strategies and theories exist to explain the complexities of human choice and the process of changing behaviour, and an argument has developed for the importance of an integrated approach to environmental education for transport which encompasses knowledge, attitude and behaviour in order to achieve change (Victoria Transport Policy Institute, 2002). The interaction between these elements in the context of changing human behaviour is linked strongly to theories of human learning and attitude change. In order to thoroughly understand the reasoning behind TDM strategies and explain transport mode choice through external and internal influences on individuals’ behaviour, it is necessary to examine this educational, psychological and theoretical basis of behaviour change. Chapter 4 will examine these elements, first considering transport as an environmental behaviour, outlining learning and adult environmental education strategies, examining self-regulated learning theory, attitudes and behaviour, and finally outlining organisational theory.
4.1 Transport as an environmental behaviour

It is clear that the problems arising from car use result from the cumulative effect of many individual choices and behaviours of car users (Steg & Tertoolen, 1999). As such transport choice could be considered to be one of the raft of environmental behaviours similar to recycling and energy use. These behaviours are all characterised by the potential for individuals to make a positive or negative contribution to the environment subject to their choice of behaviour, for example, whether to recycle an object or not. It is the opportunity to sway the individual’s choice to achieve a more positive environmental outcome that is of interest to environmental educators seeking to facilitate behavioural change.

Environmental issues have been a growing source of concern to the community over the last few decades (Lothian, 1994). The Australian Bureau of Statistics reports that 70% of Australians consider environmental protection to be as important as economic growth, and that environment is ranked as the fifth most important issue after crime, health, education and unemployment (Australian Bureau of Statistics, 1996, 2002). While the environment is a common source of concern, human decisions are influenced by more than one factor at once. For instance, environmental degradation, which does not have as immediate an impact on the individual as does redirected health funding or sudden unemployment, is labeled as a
lower priority. Preference is given to actions that will attend to the most immediate source of risk, and as a result physical support for the environment becomes far more difficult. Even so, community studies have identified a deep desire for positive environmental outcomes and preservation of environmental quality (EPA, 1994). Lothian (1994) reported that 75% of Australians felt they were concerned for and supportive of the environment. Despite this apparent support, often described as ‘verbal commitment’ to the environment, actual behaviour is often found to be contradictory (Baudains, 1998; Clarke, 1996; Finger, 1994). This inconsistency between intention and behaviour is the focus of much literature in the fields of psychology and education, and provides an important background to the current research, which aims to bring behaviour more in line with attitude in Perth commuters.

4.2 Defining psychological constructs

In order to explore the issue of behaviour change it is necessary to highlight the definition of a few psychological concepts that will be used throughout this research. These include the closely related concepts of values and attitudes, knowledge, motivations and goals, self-efficacy, and finally behaviour and behavioural change. It is necessary to state clearly the meaning of these terms in the context of this research as there are many interpretations of the meaning and application of these psychological constructs currently in use across disciplines and within the literature.

*Knowledge* can be broadly defined as the mental components of an individual that result from any and all processes, whether innately given or experientially acquired (Reber, 1995). A more simplified definition, and the one adopted for this research, is
that knowledge is, collectively, the body of information possessed by a person, or, by extension, by a group of people or a culture (Reber, 1995). It is this body of information possessed by and accessible to the individual that education about the environment (see chapter 1) aims to increase.

Values are considered to be beliefs derived from physical, emotional and intellectual (cognitive) needs, which influence attitudes and behaviour (Gilbert, 1996; Rokeach, 1973). Attitudes on the other hand are more specific evaluative statements or beliefs about objects, such as opinions or ideas, and as such are more numerous and varied than values (Fishbein & Ajzen, 1975). Values are important because they mediate attitudes – they are the cause, the underlying reasons, but they are more basic, more central, they transcend objects and situations, and as a result are more abstract and difficult to measure. Attitudes are more specific and concrete, and often more situation related and can be measured with carefully constructed questionnaires (Kuo, 1994). Both values and attitudes are comprised of three components: cognitive (knowledge, awareness and intellectual components); affective (feelings attached to the attitudes or values); and behavioural (the aspects leading to action). The functions of both values and attitudes include setting standards to guide activity (heuristic, evaluative), allowing adjustment to society and situations, allowing cohesion, abstraction and predictability of action, allowing individuals to rationalise behaviour (ego-defensive), and allowing the maintenance and enhancement of the development of self (self-actualisation).

Motivations are the more specific reasons that underlie, guide and influence behaviour (Maslow, 1954). Motivations are the reasons ‘why’ an individual is
interested in an area, or willing to participate in an activity. In theories of motivation it is assumed that people have needs (Alderfer, 1969; Maslow, 1954) and desires (Pinder, 1984; Vroom, 1964) that they strive to satisfy (Garling et al., 2002). Determining what motivates individuals to act in particular ways is useful when attempting to achieve particular behaviours through education. Goals are operationalised motivations. They are very specific, and there can be many different motivations behind the formation of one goal. Research on goal setting has focused on the relationship between goal difficulty and performance (Garling et al., 2002).

According to Bandura (1986), of all the thoughts that affect human functioning, standing at the very core are self-efficacy beliefs, which are described as "people's judgments of their capabilities to organize and execute courses of action required to attain designated types of performances" (Bandura, 1986, p. 391). Pajares (2002) explains that self-efficacy beliefs provide the foundation for human motivation, well-being, and personal accomplishment because unless people believe that their actions can produce the outcomes they desire, they have little incentive to act or to persevere in the face of difficulties. Much empirical evidence now supports Bandura's contention that self-efficacy beliefs touch virtually every aspect of people's lives—whether they think productively, self-debilitatingly, pessimistically or optimistically; how well they motivate themselves and persevere in the face of adversities; their vulnerability to stress and depression, and the life choices they make.

*Behavioural intention* can be defined as the way in which people say they intend to behave or act, and is often different to actual behaviour of the person. *Behaviour* on
the other hand, is a generic term used in psychology literature which refers to acts, activities, responses, reactions, movements, processes, operations and so on. In short, behaviour can be broadly defined as any measurable response of an organism (Reber, 1995). The history of the psychology discipline allows behaviour to be more practically defined depending on the focus of a particular study which may include cognitive processes, emotional or affective processes, as well as the overt or physically observable behaviour. Behaviour can refer to either actions (overt) or thinking (mental), but in environmental education the focus tends to be on the overt – the actual behaviour – which is the goal of the educator. Behaviour change (or learning) is dependent on both internal and external factors. Internal factors being existing knowledge and perceptions, feelings, beliefs, internal representations, and external factors referring to opportunities, information, and obstacles encountered in environment. Education often focuses on the individual, generally trying to achieve a change in the individual (knowledge, attitudes etc), but there are often external factors that need to be addressed too. There is a need to get the individual to address the external barriers to the desired behaviour.

4.3  Relationships between psychological constructs

There has long been a recognised inconsistency between behavioural intention and actual behaviour (Hatwell, 2000). Individuals with high positive environmental attitudes who indicate they intend to participate or complete a particular activity, often report a lower level of actual behaviour (Andrich & Styles, 1998; Styles, 1993). While links do exist between levels of attitude, knowledge and behaviour, an increase in one does not necessarily result in an increase in another (Styles, 1993). One explanation is existence of conflicting values. Individuals may value the
environment and its preservation but also value their current lifestyle despite negative impacts on the environment, therefore having simultaneously two sets of conflicting attitudes. This is known as cognitive dissonance which is described by Tertoolen et al. (1998, p172) as an “inconsistency between attitudes or between attitudes and behaviour”. This is particularly relevant to the use of the motor vehicle, and "since the car is perceived as a symbol of one's independence, attempts to reduce private car use often evoke psychological resistance" (Tertoolen et al., 1998, p171). Another explanation of this phenomenon is the higher level of difficulty associated with action as opposed to professed attitude (Andrich & Styles, 1998; Styles, 1993). No matter how positive an individual is about particular behaviours, if there are significant external and/or internal barriers to completing the behaviour, its incidence will be lower than may be expected.

Hatwell (2000) confirmed what Duncan (1985) had suggested; that attitude and behaviour could be placed on the same continuum, as different manifestations of the same construct, but the further contestation that attitude is “easier” than behaviour appeared to be too simple according to Hatwell’s data. The data seemed to support the contention that attitude alone is not sufficient to explain behaviour, and that attitude and level of involvement may be more effective predictor of behaviour. The demographic information collected explained some but not all assumptions about the relationship between attitude and behaviour, although the correlation between attitude and behaviour was very low in the urban sample while moderate in the rural sample. Hatwell (2000) suggested that part of this difference between rural and urban relationships between attitude and behaviour is explained by the differing situations of the groups examined. In Hatwell’s study farmers’ attitudes and
behaviour to land degradation relate directly to their livelihood, while for urban
dwellers most behaviour relating to dealing with urban pollution are not directly
related to their livelihood and must be carried out in their leisure time. This
observation was used to explain the difference in the relationship between attitude
and behaviour between the two groups, and shows the relationship between attitude
and behaviour is moderated by other related factors. Measurement of attitude will be
briefly discussed in the methodology chapter.

There is much discussion regarding aspects of behaviour and as a result the term has
come to reflect the theoretical point of view of the user. In the context of the present
research the term will be defined as the action following from learning, which is
considered to be the acquisition of skills or information through interaction with the
environment (Biggs & Moore, 1993). As intervention programs are designed with
particular conceptual understandings of learning in mind, understanding something
of the range of theories of learning and how it occurs is important in the context of
this research and they are briefly examined before further pursuing behaviour related
concepts.

4.4 The process of learning

Learning can generally be defined in two ways. Firstly, it is described as knowledge
acquired by systematic study in any field or fields of scholarly application (Biggs &
Moore, 1993). Secondly, it is described as the modification of behaviour through
interaction with the individual’s environment (Bandura, 1977). These definitions
provide an important distinction. One type of learning requires structured forms of
education, while the other occurs through experience, not necessarily through a
school or institution. In both cases learning can be perceived as a social phenomenon, with social agents such as parents, teachers, peers, mentors and others in the community influencing the development and learning of individuals throughout life (Greenall-Gough, 1993).

Learning has been the focus of educational psychologists for a long time. As a result many theories about how learning occurs have been developed, which are characterised by different interpretations of the phenomenon of learning and different educational applications. Over time some of these have become more applicable than others, but they all provide insights into the complicated processes of learning. There are six major perspectives or theories of learning (Styles & Lawrence, 1986):

1. Behaviourist;
2. Cognitivist (developmental and human information processing);
3. Social learning theory;
4. Humanistic psychological;
5. Self-regulation of learning; and

As theories they represent the best interpretations of the learning process from particular perspectives. In formal education settings components from all these theories are regularly used by teachers to determine the best way in which to further their students’ education in various learning areas and often combined to create an approach that suits an individual classroom. In the case of community and adult education in informal settings the educators generally make particular assumptions about the education they provide and how they expect it to influence their participants. While educators in these situations may not always be aware of learning theory, the assumptions and approaches they choose generally align with
one or more of the six major theories of learning. These learning theories are summarised in table 4.4.1 with examples of strategies that may be applied in travel demand management programs. Particular elements of some of these theories can also be identified. The strategies and applications of these theories are now examined.

**Behaviourist strategies**

While behaviourist theories cover a wide range of research including stimulus-response, conditioned responses, physiological responses, and causal roles of internal, covert or mental processes, they are perhaps best known by educators for the use of rewards or incentives to modify and maintain behaviour through positive or negative reinforcement of a desired behaviour. The use of incentives in education has been a thoroughly debated subject. While many variations in the use and definition of the term incentives can be found they generally reflect the underlying notion that an incentive is a motivator of behaviour (Reber, 1995). In this context an incentive can be either an inducement to respond in a particular way (conditional satisfaction of need), or a supplemental reward that functions by maintaining behaviour prior to reaching the primary goal. In both cases the likely success of the incentive is proportional to the value placed on the incentive by the target individual, i.e. an individual who is not hungry will place little value on food as an incentive to behave in a particular way. Incentives can be tangible or intangible, and can be directed from an outside source or from the innate advantages of the behaviour itself. Generally incentives are defined as a product or consequence which benefits the individual engaging in the behaviour.
Incentives can be an important component of a community-based social marketing program, particularly when motivation to engage in a sustainable behaviour is low (McKenzie-Mohr & Smith, 1999). Behaviour motivated by rewards or punishments controlled by outside forces is considered to be extrinsically determined, or a result of ‘extrinsic motivation’. Usually in these situations inner satisfaction or dissatisfaction is considered less important or irrelevant. An example of extrinsic motivation is the effort school students put into achieving good grades while showing little concern for the acquisition of knowledge or understanding along the way. In contrast, an example of intrinsic motivation would be the effort an individual puts into solving a puzzle, where the only benefit for the individual is the feeling of satisfaction experienced when the puzzle is solved.

Research in behaviour modification often highlights the importance of positive reinforcement to reward desired behaviour. When sustainable behaviours, such as recycling, are rewarded with lower garbage disposal costs, the likelihood that people will recycle in the future increases (McKenzie-Mohr & Smith, 1999). In contrast, disincentives or negative reinforcement, are often less predictable since the punishment suppresses an unwanted behaviour but does not directly encourage a positive alternative. A concrete example of the relative effectiveness of incentives versus disincentives is provided by research in littering which has shown that bottle deposits that reward people for not littering are far more effective than fines that punish people for littering (Cialdini, Reno, & Kallgren, 1990; Geller, Brasted, & Mann, 1979; O’Neill, Blanck, & Joyner, 1980). Incentives have also been reported to be most effective when they are used simultaneously with the desired behaviour.

Charging for the use of plastic shopping
<table>
<thead>
<tr>
<th>MAJOR THEORY</th>
<th>INTERPRETATION OF LEARNING PHENOMENA</th>
<th>EMPIRICAL FOCUS OF THEORISING &amp; RESEARCH</th>
<th>TYPICAL DATA COLLECTION</th>
<th>EDUCATIONAL APPLICATIONS</th>
<th>TDM APPLICATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>COGNITIVIST</strong>&lt;br&gt;DEVELOPMENTAL&lt;br&gt;Piaget, Bruner, Kohlberg.</td>
<td>Learning determined by level of cognitive structural organisation, via processes of assimilation &amp; accommodation, cognition develops with age &amp; interaction with the world. Learning acquired &amp; applied in procedures &amp; processes for storing information in memory &amp; applying to problems.</td>
<td>Solutions to problem tasks assumed to reflect cognitive organisation. Inferences from samples of thinking to underlying structures of intellect. Solutions to problem tasks, computer simulations, processing models of mental processes.</td>
<td>Presentation of scientific &amp; verbal problems for demonstration of reasoning levels. Representation of storage &amp; problem solving inferred from moves to solve puzzles, etc.</td>
<td>Matching of teaching &amp; curriculum materials to developmental levels, etc.</td>
<td>Checklists, Instructions, Reinforcement</td>
</tr>
<tr>
<td><strong>HUMANISTIC PSYCHOLOGICAL</strong>&lt;br&gt;Rogers, Maslow.</td>
<td>Learning influenced by social influences via observational learning &amp; reinforcement.</td>
<td>Modelling, social inferences to explain social behaviour &amp; personality.</td>
<td>Experimental manipulations, correlational studies of influence.</td>
<td>Changes in behaviour, explanations, modifications.</td>
<td>Role models, Social norms Social diffusion</td>
</tr>
<tr>
<td><strong>SOCIAL LEARNING THEORY</strong>&lt;br&gt;Bandura.</td>
<td>Learners are active constructors of knowledge, but dependent on others in their society for learning from inter-individual to intra-individual as learner internalises concepts/skills etc.</td>
<td>Social interaction, adult/child &amp; child/child is THE WAY in which learning takes place: it IS learning. Collaborative learning is considered vital</td>
<td>Researchers interview or observe paired interactions (adult &amp; child)</td>
<td>Use reciprocal teaching methods (adult &amp; child exchange roles as learner/teacher)</td>
<td>Leadership &amp; Modelling. Shared responsibility for change.</td>
</tr>
<tr>
<td><strong>VYGOTSKIAN THEORY</strong>&lt;br&gt;Vygotsky.</td>
<td>Learners are active participants in their own learning. Self-regulated learners adapt to self, task &amp; context characteristics.</td>
<td>Learning strategies to plan, monitor, evaluate &amp; regulate learning, knowledge about learning.</td>
<td>Correlation studies of effective learning strategies, intervention research to foster self-regulated learning.</td>
<td>Instructional methods that promote students control over their own learning.</td>
<td>Green transport planning. Learner ownership of plan.</td>
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bags in supermarkets brings attention to the cost of using disposable bags and increases motivation to bring reusable cotton bags (Burn & Oskamp, 1986).

On the other hand, the problem with purely incentive based approaches such as reward programs is that they must be ongoing forever (in order to sustain the behaviour-reward link) and as such become more and more expensive as more individuals join for the benefits. The result of incentive driven behaviour is that if the incentive is withdrawn for any reason the other benefits of the behaviour may not be enough to overbalance the ‘loss’ of the previously provided incentive. It may be perceived by the individual that the behaviour is no longer ‘worth it’. Based on assumptions of behaviourist learning and social learning theory, evidence suggests inducements do not sustain behaviour once the inducement is removed (Burn & Oskamp, 1986; McKenzie-Mohr & Smith, 1999). There is a risk of achieving negative results when introducing incentives to foster a sustainable behaviour and then removing them. Many individuals engage in sustainable activities, such as recycling, because it makes them feel that they are making a positive contribution (Burn, 1991). When intrinsic motivations are replaced with incentives, or external motivations, internal motivations can be undermined if an incentive is introduced and then removed as the behaviour may become dependent on the external motivator, and its loss becomes a disincentive (McKenzie-Mohr & Smith, 1999). Successful incentives which have been tested tend to be large scale policy level decisions and are often more ‘disincentives’ than incentives, for example charging garbage collection fees to increase recycling (McKenzie-Mohr & Smith, 1999).
Many studies have used incentives or inducements in attempting to change human behaviour: some have been positive; while others have shown little success. For example, a study by Bachman and Katzev (1982) found that there were no differences between the effects of giving individuals free rides and seeking a personal commitment to using the bus. The free tickets condition produced a greater absolute number of bus rides, but it did not stimulate as many individuals to ride the bus as conditions where individuals have made a personal commitment to engage in this behaviour (Bachman and Katzev, 1982). Debats (1981) on the other hand found that when Seattle’s First National Bank (Seafirst) bought bus passes and offered them to all employees free of charge, over 12 million employee driven miles were eliminated annually and the scheme attracted 3,000 of the 7,500 employees. Seafirst had to negotiate bus agreements with eleven transit districts in order to allow its employees to travel free. The incentive for the organisation was that it was able to forego building expensive new parking sites for its employees. The most commonly used incentive for trip reduction is free transport, either as free vans for vanpooling, free bus tickets, or free bicycles. Travel demand management programs which have successfully made use of incentives, inducements or disincentives include TravelSmart South Perth, ‘Bus with Us’, ‘Commute a Van’, STEPS, Business Travelwise, and Boots Commuter amongst others (table 3.1.1).

In incentive based programs such as SeaFirst, or the CONOCO vanpool scheme (Debats, 1981) where free vans were provided for employees to travel together to work, it would be interesting to see what the consequences of removing the incentive would be. If educational theory holds and the incentive has only developed extrinsic motivation in the individual, it is likely that the behaviour would not be continued as
the participant may not see any value in it. Researchers of some transport behaviour programs however, argue that the intrinsic benefits of alternative transport would be recognised automatically once the individual had been convinced to ‘try it out’. The Cycle 100 program worked on these principles, with participants being given a free bike if they agreed to cycle on two days of each week to work for a particular period of time, but once the health and aesthetic benefits of cycling became apparent the participants increased both the distance and number of days they cycled each week, accumulating an extra 2000 kilometres cycled per month above the agreed target for the 63 participants (Marshall, 1999).

**Cognitivist Human Information Processing Strategies**

In contrast to the incentive based approach, the cognitivist, social learning, and humanistic psychological theories depend solely on internal or intrinsic motivation. Intrinsic motivation refers to the motivation of any behaviour that is dependent on factors that are internal in origin, and is usually derived from feelings of satisfaction or fulfillment rather than external rewards. For intrinsically motivated learning to occur individuals must value the new knowledge being offered, or value the potential results from a change in their own behaviour. Different levels of emphasis are placed on intrinsic motivation across these remaining theories, and different learning phenomena are highlighted as summarised in table 3.1.1.

Educational strategies involving large-scale distribution of information are most closely related to cognitivist learning theories. It is often assumed by the educator that any information provided will automatically be read, processed and remembered by the learner (Merriam & Caffarella, 1991). Following this, an equally common
assumption in adult education is that increasing awareness or knowledge of an issue will automatically increase the occurrence of a desired behaviour. It would be assumed that once people understand there are environmental problems associated with car use, they are more willing to change than when no problem is conceived (Steer Davies Gleave, 1999). This results in the belief that achieving behaviour change in the general population is as simple as distribution of information (McKenzie-Mohr & Smith, 1999).

A majority of government programs aiming to develop or encourage sustainable behaviour rely upon large-scale information campaigns (McKenzie-Mohr & Smith, 1999). These popular forms of education have been used despite a lack of evidence that this medium is effective in achieving an overt learning outcome such as behaviour change. Recent evaluations in cases such as the ‘10 Tips to minimise waste’ campaign, and the clean air campaign conducted by the WA State government in 2000 have been shown that distribution of information alone may not be effective (Baudains, 2001; White, 1999). The distribution of a checklist for waste minimisation by the WA State government to every household in the state followed by a telephone survey revealed that 83% of the sample did not recall seeing the 10 tips information. Of the 17% who did recall seeing the information, 5% could recall one or more of the ten tips, and only 2% were influenced by the information. The unanimous reason why individuals who recalled the ten tips information were not influenced by it was because they were already doing these things (Baudains, 2001). Similarly, research conducted in the Netherlands revealed that providing households with information about energy conservation did not reduce energy use (Midden, Meter, Weenig, & Zieverink, 1983). Finger (1994) also reported that information
campaigns which focus on improving knowledge or altering attitudes frequently have little or no effect upon behaviour. Two large surveys of Swiss respondents found that environmental information, knowledge and awareness were poorly associated with environmental behaviour (Finger, 1994).

These campaigns are usually based on one of two perspectives regarding changing behaviour: increasing knowledge and targeting attitudes; or an economic self-interest approach (McKenzie-Mohr & Smith, 1999). The first perspective assumes that changes in behaviour are brought about by increasing public knowledge about an issue, such as decreasing landfill capacity, and by fostering attitudes that are supportive of a desired activity, such as recycling. Accordingly, programs based on this perspective attempt to alter behaviour by providing information, through media advertising, and frequently the distribution of brochures, flyers and newsletters (McKenzie-Mohr & Smith, 1999). The second perspective assumes that individuals systematically evaluate choices, such as re-using household materials, or purchasing a low-flow showerhead, and then act in accordance with their economic self-interest. This perspective suggests that in order to affect these decisions, an educator need only provide information to an individual that something is in their financial best interest and consequently the individual will behave accordingly. Both information campaigns that focus on altering knowledge and efforts that have concentrated on pointing out the financial advantages of a sustainable activity have been largely unsuccessful (McKenzie-Mohr & Smith, 1999).

Information campaigns proliferate because it is relatively easy to distribute printed materials or air radio or television advertising (Larson & Massetti-Miller, 1984).
There is also some evidence that mass media can effectively distribute information. The New South Wales EPA reported that most people find out about environmental issues through the television or mainstream press. Business and industry were seen as the least reliable sources of information about the environment (EPA, 1995). Advertising, however, is often an extremely expensive way of reaching relatively few people (Pope, 1982). Annually, California utilities spend $200 million (US) on media advertising to encourage energy conservation. These advertisements encourage householders to install energy conserving devices and adopt habits that will decrease energy use, such as closing the blinds during the day. Despite massive expenditures, these campaigns have had little effect on energy use (Costanzo et al., 1986). Costanzo et al. (1986) points out that although advertising is an important tool for creating awareness, it is wasteful to invest most of our efforts in an influence strategy that has such a low probability of success (Costanzo et al., 1986).

The failure of mass media campaigns to foster sustainable behaviour is due in part to the poor design of the messages, but more importantly to an underestimation of the difficulty of changing behaviour (Costanzo et al., 1986). Costanzo and his colleagues note that most mass media efforts to promote sustainable behaviour are based on traditional marketing techniques in which the sustainable activity is viewed as a ‘product’ to be sold. Advertising, they note, is effective in altering our preference to purchase one brand over another. But altering consumer preferences is not creating new behaviour, rather it involves altering an existing behaviour. As they indicate: "These small changes in behaviour generally require little expense or effort and no dramatic change in lifestyle" (Costanzo et al., 1986, p526). In contrast, encouraging individuals to engage in a new activity, such as composting or re-using
shopping bags, is much more complex. A variety of barriers exist, such as concerns over time, hygiene, and convenience. The diversity of barriers which exist for any sustainable activity means that information campaigns alone will rarely bring about behaviour change (McKenzie-Mohr & Smith, 1999).

McKenzie-Mohr and Smith (1999) suggest that information and economic approaches fail because they do not pay adequate attention to the human side of promoting more sustainable environmental behaviour. As the United States National Research Council concluded, this view of human behaviour overlooks: "the rich mixture of cultural practices, social interactions, and human feelings that influence the behaviour of individuals, social groups, and institutions." (Stern & Aronson, 1984). It was a similar concern among educational theorists that prompted early work on social learning theories.

Education theorists are well aware of the limited success of information based education, with numerous studies documenting that education to increase knowledge alone often has little or no effect upon sustainable behaviour, and it is often thought that incentives or legislation would be more effective approaches to achieving behavioural change (McKenzie-Mohr, Nemiroff, Beers, & Desmarais, 1995; McKenzie-Mohr & Smith, 1999). However, behaviour change programs which rely on strategies other than broad scale information programs have also met with mixed success. Research has shown that even with the power of mandates and the availability of support services such as curbside pick up of recyclables, recycling behaviour is not always adopted (Simmons & Widmar, 1990).
**Social Learning Theory Strategies**

Bandura’s (1977) social learning theory depicts learners as more active participants in the learning process, who are influenced not just by intellectual facts and information, but also by social interaction. There is a dependency on social interaction and the observation of others’ behaviour. This relates to role models, peer group support, social diffusion, and other concepts of behavioural transfer from one individual to another. The focus for educators is on the facilitation of learning, but learning is still considered to be information processing. This is an important distinction from the cognitivist theories as while the learner is still expected to learn by being exposed to information, the educator can act as an interface and in some cases as a role model. The learner is not considered as an individual in isolation with their own learning, but in a dynamic relationship with a leader. The leadership in this sense can take many forms, but whether the contact is made personally or through the media, one of the more effective methods for increasing adoption of a sustainable behaviour is to model the behaviour we wish others to adopt.

Modelling involves demonstrating a desired behaviour (Bandura, 1977). Work by Burn (1991) indicates role models are an important part of achieving a social change. Interestingly, modelling can occur in person or through television or videotape. Research has documented significant change in energy use behaviour in response to either a taped or live broadcast that demonstrated simple conservation methods and mentioned the financial benefits to be gained from carrying them out (Winett et al., 1982; Winett, Leckliter, Chinn, Stahl, & Love, 1985). The adoption of new behaviours, such as recycling and composting, frequently occurs as a result of friends, family members or colleagues introducing them, thereby acting as role models.
models (McKenzie-Mohr & Smith, 1999). This process is referred to as social diffusion (Rogers & Shoemaker, 1971). This process of social diffusion has been documented as highly effective in increasing the uptake of new behaviours, as demonstrated by Nisbett et al. (1976) who showed farmers that received direct assistance with alternative farming practices were much more likely to influence others to adopt similar practices than those targeted with information-based campaigns. Research shows that the best models are those most like the learners. While social diffusion appears to be a powerful process, it has been greatly under-utilised in attempts to promote sustainable behaviour (McKenzie-Mohr & Smith, 1999).

Burn (1991) outlined another method of encouraging behavioural change through social interaction using block leaders. In order to encourage non-recyclers to participate in an existing curbside recycling program citizens who already recycled were asked to approach their non-recycling neighbors. These block leaders gave a persuasive appeal which incorporated a graphic description of the amount of garbage produced annually by Californians and gave recycling as a specific action that could solve the refuse problem. The behaviour of the block leaders enabled the non-recyclers to identify with their near peers engendering a social diffusion of the recycling behaviour. This resulted in 28% of the non-recyclers who were visited by the block leaders taking up recycling, while only 12% of the group that only received information began recycling (Burn, 1991).

Another method shown to be successful is that of personally encouraging people to commit to a few new behaviours. An example of this strategy is the 1-2-3 Global
Warming Campaign which was initiated in the 1st Unitarian Church in Portland, Oregon in January 2001 to inform people about the dangers of global warming and spur them into action to do something about it. Congregants were asked to 1) reduce their household thermostats by 1 degree in the heating season; 2) reduce their driving speeds by 2 miles (3.4 km) per hour from the speed they would normally drive when traveling 60 miles (95.5 km) per hour or more; and 3) replace three regular light bulbs used extensively at home with compact fluorescents. These three actions would reduce carbon dioxide generation by 1,300 pounds (589.7 kg) per year and save the average household about $90 (U.S.) annually. Participants, who signed pledge forms, had the flexibility to take any or all of the three actions. The Campaign featured a Kickoff program, mailing to all households, public support from the ministers, and weekly compact fluorescent light bulb demonstrations and church bulletin updates. Some 98% of the households fulfilled all (55%) or some (43%) of their pledges, and 95% of the sample planned to continue their actions. Even more promising, 63% took additional actions against global warming on their own, specifically citing what they had done.

Vygotskian Strategies

Vygotskian theory on learning incorporates elements of Piaget’s developmental and maturation theory, Thorndike’s intellectual development as an accumulation of habits and conditioned responses, and the Gestalt school where intellectual development is regarded as an interaction of maturation and learning as independent processes (Connell, 1980). The Vygotskian position is an interactionist one like that of the Gestaltists, but he placed more importance on the role of learning that comes through effective teaching. Vygotsky demonstrated that conscious thought is the
prerequisite to the mastery of intellectual activities. He indicated that through language (a human made tool) intellectual growth can be actively expanded and controlled, and he affirmed teaching as a decisive motive force in intellectual development (Connell, 1980).

Through social guidance, children are presumed to gradually internalise the skills that were practiced with adult support so that they can be performed independently (Vygotsky, 1978; Wertsch, 1979). Collaborative learning, where more competent or experienced peers as well as teachers/educators can aid the learners’ development is a key Vygotskian strategy (Moll, 1990).

In Vygotskian theory, learning is a joint effort between the leader and the learner. The educator facilitates learning by providing challenges and problems for the learner to solve, but supports the learner through this process. It is a student centred model, but emphasis remains on the actual learning, rather than learning how to learn. The leader scaffolds the students’ learning, so learning proceeds from both interpersonal and intrapersonal sources.

Education principles for student centred learning practices suggest that information alone does not result in a positive learning outcome (Boulton-Lewis, Wilss, & Mutch, 1996). Usually what is recommended is some direction or facilitation by another individual acting as teacher or educator. Merriam and Caffarella (1991) report that the more the learning strategies are focused on involving and empowering the learner the more effective they are expected to be. In the case of environmental outcomes it has been suggested that effectiveness of achieving outcomes can be
improved by modeling the behaviour through a facilitator or mentor. This has been shown to be effective in some cases (Aronson & O'Leary, 1982).

Some of the workplace trip reduction programs could fit into this learning theory with the consultant or facilitator guiding the workplace through the series of steps to determine transport needs and barriers to change, making recommendations and partnering the construction of a plan to achieve behaviour change. The ownership of the process and therefore much of the product belongs to the educator rather than the learner.

**Self-Regulation of Learning theories**

The theories of learning that focus on self-regulation include the theories of Brown, Paris and Zimmerman (Brown & Smiley, 1977; Paris & Byrnes, 1989; Zimmerman, 1986). Many authors have reported that learning (behaviour change) is more effective if the learner is self-regulated, that is, aware and in control of their own learning (Boulton-Lewis *et al.*, 1996; Zimmerman & Schunk, 1989). A common conceptualisation of self-regulated learners that has emerged is that they are metacognitively, motivationally and behaviourally active participants in their own learning. Zimmerman (1990) explains these three aspects of the self-regulated learner:

“In terms of *metacognitive processes*, self regulated learners plan, set goals, organize, self monitor, and self evaluate at various points during the process of acquisition (Corno, 1986, 1989; Ghatala, 1986; Pressley, Borkowski, & Schneider, 1987). These processes enable them to be self aware, knowledgeable, and decisive in their approach to learning.
In terms of motivational processes these learners report high self-efficacy, self attributions and intrinsic task interest (Borkowski, Carr, Rellinger, & Pressley, 1990; Schunk, 1986; Zimmerman, 1985). To observers, they are self starters who display extraordinary effort and persistence during learning. In their behavioural processes, self regulated learners select, structure and create environments that optimize learning (Henderson, 1986; Wang & Peverley, 1986; Zimmerman & Martinez-Pons, 1986). They seek out advice, information, and places where they are most likely to learn; they self –instruct during acquisition and self reinforce during performance enactments (Diaz, Neal, & Amaya-Williams, 1992; Rohrkemper, 1989).”

(Zimmerman, 1990, p4-5)

Self-regulated learning has also been described as "the way learners select and articulate their goals for learning and understand and manage the learning process in order to achieve these, and includes motivational, attitudinal, strategic, and metacognitive components," (Radloff, 1997). Radloff (1997) combined elements of self-regulated learning theory from Brown and Zimmerman to form a model of self-regulated learning applicable to adult learners.

A characteristic of adults who are self-regulated learners is that they make a conscious effort to address the situation and attempt to reduce the influence of existing barriers on their behaviour. They can be very determined to achieve their goals. They are able to assess circumstances, isolate the areas on which they can have some influence, and remove themselves from the influence of some barriers. It has been observed that few adults are self-regulated learners (Radloff, 1997). As a
result, adult learners need to be provided with opportunities to reflect on their beliefs, goals and knowledge in order to develop new understandings, which may result in changed behaviour. A strong argument therefore exists for the application of self-regulation of learning theory in community and adult education where the educator aims to achieve voluntary behaviour change.

Environmental education strategies which could be considered as utilising self-regulation of learning theory include programs which have involved individuals, communities or groups in goal setting, problem solving and monitoring of their own progress in achieving environmental behaviour goals. In the context of transport behaviour change programs, it could be argued that some green transport or commuter travel planning programs incorporate self-regulation of learning strategies into the planning process. On an individual level, the process of developing a green transport plan could incorporate the identification of the target behaviour, identification of barriers to that target behaviour, and then the setting of personal goals to address the barriers and attempt to achieve the target behaviour, which may be as simple as driving to work one day less each week. An educational process which facilitates and supports the efforts of individuals to set goals, work toward them and evaluate their own success, clearly incorporates the metacognitive, motivational and behavioural components of self-regulated learning as described by Zimmerman (1990).

On a company scale, a transport plan depends on co-operation and a consensus that changing behaviour is in everyone's interest. The process itself builds a strong sense of identity and shared ownership of problems and solutions that can have a wider
significance for team building and productivity increases in the company as a whole (Cambridgeshire County Council, 2000; Hertfordshire County Council, 1994). According to the National Travelwise Association in the United Kingdom, a company transport strategy is unique to that company and is conditioned by the geography of the location, the culture of the company and the enthusiasm for managing change within the organisation (Travelwise, 2002b). As a result there must be a broad base of information used in developing the plan. Sources of information for the Pfizer company transport plan (Travelwise, 2002a) included detailed discussions with senior managers, a questionnaire sent out to all staff and to contract staff, focus group discussions with staff, discussion with local authorities, discussion with privatised transport providers, discussion with transport consultants, and discussions with the regional transport authority about the allocation of government funds for rural buses and the preparation of its funding bid for the next round of transport funding from central government.

The self-regulation of learning perspective on adult learning and behaviour could be utilised in a workplace situation where the aim is to educate for behaviour change.

This research attempted to move outside the traditional information based education campaign in order to examine the role of education strategies that focus on adults as self-regulated learners. The underlying theory in the design of these education programs was that as the level of self-regulation and self-efficacy increased the participants would become more self motivated learners and any learning that occurred would be higher impact and longer lasting due to the intrinsic development of that learning. Interventions in this research are based on cognitivist information
processing and social learning theories as comparisons to self-regulation of learning theory which is the major focus of the research.

4.5 Environmental Education in the workplace

The importance of work-based environmental education programs as a means of helping to achieve an ecologically sustainable society has been argued by a number of authors (Henning, 1984; NIACE, 1993; Shaw & Dingle, 1998; Victorian Environmental Education Council, 1992; Walker, 1996). NIACE (1993) argues that adults are the majority of citizens, consumers, workers, employees and parents and represent an enormous potential force for change which must be mobilised to achieve environmental improvements (NIACE, 1993). The Confederation of British Industry (1992) argues that all individuals regardless of occupation or position, will need an understanding of the major environmental issues, the importance of those issues globally, knowledge of how they affect the business and their personal role in achieving the environmental objectives of the business. Biehler-Baudisch (1994) also believes that “all occupations are directly or indirectly related to environmental protection.” Toyne (1993, p24) further supports the need for the environmental education of adults by stating : “what is required across the workforce as a whole is at least the same level of consciousness as is nowadays expected of employers and employees in such areas as health and safety or equal opportunity.”

Industry as part of society is strongly linked to global environmental problems (Shaw & Dingle, 1998). Recognisable links between industry and the environment are becoming more evident with many companies acting to implement processes and practices and adopt policies and strategies to improve environmental performance.
Industry plays a crucial role in the social and economic development of a nation (IUCN, UNEP, & WWF, 1991) and although industry generates substantial amounts of wealth, it also contributes to environmental degradation (Holmberg, 1992; Ledgerwood, Street, & Therivel, 1992). Many of the critical environmental challenges of today, such as pollution from production processes and the use and disposal of products, can be traced back to the workplace (Kohler, 1993). While source pollutants and waste management are often the focus of corporate environmental strategy (Shaw & Dingle, 1998) the environmental impact of staff travel which is often greater than any other direct environmental impact is often overlooked (Emerson & Tansley, 1999).

Industry has the capability to contribute to the solution of many environmental problems and has been described as the engine for sustainable development (Fitzgerald, 1997; Vaitilingham, 1993). It has the power to significantly contribute to addressing environmental issues (Bellamy, 1993). Recognition that caring for the environment is also a business opportunity, with the ability to create a competitive edge, is beginning to grow (Coopers and Lybrand Consultants, 1994; Stevens, 1992).

With environmentally responsible practices becoming a focus for business, education strategies that are effective and practical in a workplace setting must be developed. Educating a workplace is likely to require different strategies from those successful in the education of individuals. Walker (1996) reported that in addition to formal education programs, informal education and work-based cultural influences appear to mediate the environmental attitudes and beliefs of staff (Walker, 1996). According to Robbins et al. every organization has a culture and, depending on its strength,
culture can have a significant influence on the attitudes and behaviours of organisation members (Robbins, Waters-Marsh, Cacioppe, & Millet, 1994). This has significant implications for achieving environmental outcomes within organisations. As Shaw and Dingle (1998) point out, organisational culture that is status oriented and unsupportive of innovation is in direct conflict with the values of sustainable business. In addition, Emerson and Tansley report that organisation culture issues need to be taken seriously if the impact of green commuting measures are not to come into conflict with organisational values (Emerson & Tansley, 1999). This has implications for any educational intervention if it is to be provided in a workplace setting. Therefore it is necessary to examine organisational behaviour theory in order to clearly identify the impacts and components of organisational culture, and understand their possible influence in the present research.

4.6 Organisational Behaviour Theory

The study of organisational behaviour investigates the impact that individuals, groups and structure have on behaviour within organisations, for the purpose of applying such knowledge toward improving an organisation’s effectiveness. Organisational behaviour integrates a number of behavioural science disciplines including sociology, psychology and social psychology. Each of these disciplines contributes particular elements to the understanding of group behaviour and individuals in a group situation. Figure 4.6.1 shows how these disciplines each contribute to the study of organisational behaviour. Organisational behaviour as a discipline in its own right focuses on the organisation, which can be defined as a consciously co-ordinated social unit, composed of two or more people, that functions
on a relatively continuous basis to achieve a common goal or set of goals (Robbins et al., 1994).

**Figure 4.6.1** Disciplinary contributions to organisational behaviour.

Source: (Robbins et al., 1994 p22)
Through debating the adequacy of traditional, rule based approaches and exploring managerial adaptation to situational demands, organisational theorists have proposed a number of theoretical models for describing organisational effectiveness (Quinn, Hildebrandt, & Rogers, 1991). Quinn and Rohrbaum (1983) report that organisational theorists and researchers share an implicit theoretical framework, or cognitive map for describing organisations. This framework formed the basis of the competing values model (Quinn, 1988, p50) which presents a number of bi-polar characteristics that can be used to analyse organisational and managerial effectiveness, and assess the presence of perceptually contrasting characteristics.

The competing values model (figure 4.6.2) is divided into four sections which each represent a major organisational theory. Each of the four models (quadrants) are characterised by particular descriptors, which as the model shows, are in direct conflict with the values of the opposite quadrant. For example, in the human relations model quadrant cohesion and moralality are valued, in competition with the open systems quadrant that places greater value on adaptability, readiness, growth, resource acquisition and external support.

The in-depth study of organisational behaviour and development of models such as the competing values model, has given rise to an understanding of organisational culture. The corporate culture is defined as “the basic assumptions and beliefs that are shared by members of an organization which are learned responses to a group’s problems of survival in its external environment and internal integration” (Schein, 1992, p10). An organisation’s culture is created, sustained and learned and enhances the ability to explain and predict the behaviour of employees (Robbins et al., 1994).
The origin of culture as an independent variable affecting an employees’ attitudes and behaviour can be traced back more than 40 years to the notion of institutionalisation (Selznick, 1948). When an organisation becomes institutionalised, it takes on a life of its own, apart from any of its members. It becomes valued for itself, not merely for the goods or services it provides. Institutionalisation operates to produce common understandings among members about what is appropriate and, fundamentally, meaningful behaviour (A. J. Richardson, 1986; Zucker, 1983). So when an organisation takes on institutional permanence, acceptable modes of behaviour become largely self-evident to its members (Robbins et al., 1994).
The term organisational culture generally refers to a system of shared meaning held by members that distinguishes the organisation from other organisations (Becker, 1982; Robbins et al., 1994; Schein, 1992). Robbins et al. (1994) break down this system into a set of key characteristics that an organisation values based on the ten primary characteristics reported by Hofstede et al. (1990) and O’Reilly et al. (1991) as able to capture the essence of an organisation’s culture. These ten characteristics are:

(1) **Member identity**: the degree to which employees identify with the organisation as a whole rather than with their type of job or field of professional expertise;

(2) **Group Emphasis**: the degree to which work activities are organised around groups rather than individuals;

(3) **People Focus**: the degree to which management decisions take into consideration the effect of outcomes on employees within the organisation;

(4) **Unit integration**: the degree to which units within the organisation are encouraged to operate in a coordinated or independent manner;

(5) **Control**: the degree to which rules, regulations and direct supervision are used to oversee and control employee behaviour;

(6) **Risk tolerance**: the degree to which employees are encouraged to be aggressive, innovative and risk-seeking;

(7) **Reward criteria**: the degree to which rewards such as pay increases and promotions are allocated according to employee performance rather than seniority, favouritism or other non-performance factors;

(8) **Conflict tolerance**: the degree to which employees are encouraged to air conflicts and criticisms openly;
(9) **Means-ends orientation:** the degree to which management focuses on results or outcomes rather than the techniques and processes used to achieve those outcomes; and

(10) **Open-system focus:** the degree to which the organisation monitors and responds to change in the external environment.

Each of these characteristics exists on a continuum as illustrated by figure 4.6.3.

**Figure 4.6.3** Characteristics of organisations forming their culture.

<table>
<thead>
<tr>
<th>1 Member identity</th>
<th>2 Group Emphasis</th>
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<td>Individual</td>
<td>Group</td>
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<td>Job</td>
<td>Organisation</td>
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<th>3 People focus</th>
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<td>Task</td>
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<td>People</td>
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<td>4 Unit integration</td>
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<td>Interdependent</td>
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<th>5 Control</th>
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<th>6 Risk Tolerance</th>
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<table>
<thead>
<tr>
<th>7 Reward criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Performance</td>
</tr>
<tr>
<td>Other</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>8 Conflict tolerance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
</tr>
<tr>
<td>High</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>9 Means-ends orientation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Means</td>
</tr>
<tr>
<td>Ends</td>
</tr>
<tr>
<td>10 Open-system focus</td>
</tr>
<tr>
<td>Internal</td>
</tr>
<tr>
<td>External</td>
</tr>
</tbody>
</table>

While models such as the competing values model described by Quinn *et al.* (1991) are useful in developing a clear understanding of the behaviour and educational needs of corporations, they are more detailed than required for this research. Rather than implement a model of organisational culture, the ten key characteristics described by Robbins *et al.* (1994) are used as a focus for observational/qualitative examination of workplaces, so that the influence of organisational culture on effectiveness of educational strategies for transport behaviour change may be taken into account.
Chapter 5
Conceptual Framework & Methodology

5.1 Introduction

This chapter begins by gathering together the range of concepts presented in chapters 2 to 4 and placing them into a conceptual framework in order to summarise the understandings that underlie this research. Following the presentation of the conceptual framework, the methodological approach and research design is explained, incorporating descriptions of participants, data collection methodology, and analysis procedures.

The interdisciplinary nature of a research program which focuses on human behaviour in an environmental and organisational context requires a merging of concepts from these fields. This is particularly true in the case of this research, which incorporates concepts and theory from the fields of environmental education, organisational behaviour, educational psychology and transport policy and practice.

In chapter 2 a number of possible approaches to transport demand management were outlined. This research focuses on an educational intervention approach, in a workplace context, and excludes financial and policy strategies. Chapter 3 outlined a number of transport behaviour modification programs, highlighting the differences between three main strategies - information, leadership, and involvement - which each incorporate assumptions about how adults learn. Chapter 4 explored the range of educational theories that are applicable to educational intervention, particularly for
adult learners in the workplace. This research utilises self-regulation of learning theory and incorporates it into the principles of environmental education. Each of the specialised areas addressed in chapters 2 to 4, when placed into the ‘bigger picture’, has implications for the work in the more general field of environmental education for transport behaviour change. This chapter presents the relationships amongst these areas and the concepts associated with them, by placing them within a conceptual framework.

5.2 Conceptual Framework

The various concepts involved in this research can be related to one another and explained through the use of a simplified model. The diagram in figure 5.2.1 presents this model as the interaction of the pertinent factors.

When dealing with behaviour within workplaces there are intuitively two main constructs involved, as presented on the left hand side of figure 5.2.1:

1) Organisational factors such as culture, policy and structure (described in detail in chapter 4); and

2) Individual factors such as attitudes, motivations and demographic characteristics (described in detail in chapter 4).

Educational intervention attempts to influence these factors through the application of educational strategies. The centre square of figure 5.2.1 represents the role of educational intervention, which in this research varies in the level of participant involvement from high through to medium and low level of involvement (H, M, L).
This thesis suggests that empowering and involving people in learning and decision making, thereby encouraging self-regulated learning, can increase success in changing behaviour in both individuals and organisations. The right hand side of figure 5.2.1 presents the result of educational intervention in a workplace situation as two inter-related outcomes, the changed individual and the changed organisation. It is hypothesised that as the level of involvement afforded by the educational intervention increases, so will the level of change at both the individual and organisational level.

**Figure 5.2.1**  Conceptual framework.

Variables

In order to assess the relative effectiveness of different workplace interventions on an individual and on a workplace level, a number of variables were selected for examination on the basis of literature presented in chapters 2 to 4. A summary of the variables considered in this research is provided in the following list.
List of Variables

Demographic:  Sex, Age, Suburb, Employment, Workplace

Knowledge:  Knowledge of issues relating to transport use and air pollution

Attitude 1:  Transport and air pollution

Attitude 2:  Environmental attitude (measured using NEP scale)

Attitude 3:  Attitude to the TravelSmart program (ie to change of 

behaviour)

Behaviour 1:  Transport mode choice : SOV trips

Behaviour 2:  Environmental behaviour

Self-Efficacy:  Measure relating to the level of individual empowerment

Workplace:  Function, Organisation and structure, Environment, Decision 

making process, Geographical distribution of employees, 

Facilities and barriers (eg bike racks and showers, company cars, free 

car parking), Environmental ethic/policy, organisational culture

Intervention:  Type A, B, or C intervention

At a theoretical level, figure 5.2.2 below shows how the listed variables may interact 
within the context of this research. The figure shows the explanatory factors of 
intervention type, workplace, and the demographic variables combining to influence 
the dependent outcomes. This figure serves as a theoretical model, underpinning this 
research. The next section will provide the detail of the methodological approach, 
and the specific research design based on this conceptual framework.
Figure 5.2.2  Interaction of variables involved in research.

Explanatory Factors

**Intervention type**
Type A, B, or C intervention. Varying in levels of participant (individual and organisational) involvement and ownership.

**Workplace**
Function
Organisation and structure
Environment
Decision making process
Employee geographical distribution
Facilities and barriers (eg bike racks and showers, company cars, free parking)
Environmental ethic/policy
Attitude of workplace as a whole toward sustainable transport issues

Dependent Variables (Outcomes)

**Behaviour 1**
Transport mode choice

**Behaviour 2**
Environmental behaviour

**Self-Efficacy**
Measure relating to the level of individual empowerment

**Attitude 1**
Transport and air pollution

**Attitude 2**
Environmental attitude (measured using NEP scale)

**Attitude 3**
Attitude to the TravelSmart program (ie to change of behaviour)

**Knowledge**
Knowledge of issues relating to transport use and air pollution

Demographic variables
Sex
Age
Suburb
Employment
Workplace

Experimental and independent variables

act on the employees to influence outcomes
5.3 Methodological Approach

The nature of the various interacting variables outlined in the conceptual framework suggests a single quantitative methodology will not provide an effective evaluation of the processes involved. As a result a mixed methodology paradigm utilising both quantitative and qualitative approaches was adopted. The research was run over a period of two years in 13 volunteer workplaces using qualitative evaluation techniques, in conjunction with questionnaires to measure changes in attitude, knowledge and behaviour. Different forms of workplace intervention were compared using both the qualitative and quantitative data collected through observation, pre and post questionnaire, focus groups and interviews.

Generally, information on ‘who uses what transport where and when’ is most readily obtained through a survey or questionnaire, and aspects of this research incorporate such methods (Brewer, 1989; Yin, 1994). Changes in individual participants were monitored by questionnaires distributed at the beginning and the end of each intervention. Questionnaires include items measuring environmental knowledge and attitudes, perceived obstacles and compliance, self-efficacy and behaviours associated with compliance or non-compliance.

Explanatory questions such as ‘why did workplace employees change/not change their modes of transport’ and ‘how was this change achieved’ are more suited to qualitative research techniques which trace particular phenomena and relationships with other factors through time, such as case study methodology (Brewer, 1989; Merriam, 1988). Workplaces were compared based on quantitative data collected from questionnaires, in addition to qualitative data from participant observation,
documentation of intervention techniques, and results of focus group sessions at the conclusion of each intervention.

**Validity & reliability of mixed methodology paradigm**

The nature of the context in which naturalistic research is conducted is complex, and human phenomenon cannot be completely controlled or isolated in a sterile environment. Quantitative research designs including measurement, prediction and causal inference do not always fit in isolation with the world of social science where perceptions, feelings, values, and participation are frequently the variables of importance to program evaluation (Bowen, 1996; Glassner & Moreno, 1989). While there have long been heated debates between the bi-polar quantitative and qualitative methodological encampments, an argument exists that as qualitative and quantitative methodologies are merged the internal validity of the research design is strengthened (Bowen, 1996; Breitmayer, 1993; Corner, 1990; Duffy, 1987; Morse, 1991). Bowen (1996) demonstrates in a geometric fashion (figure 5.3.1) how the triangle, denoting research methodology, is enhanced and internal validity strengthened as the two research methods merge.

**Figure 5.3.1:**
Strengthened internal validity by triangulation.
(Source: Bowen, 1996, p1.)
The complementary nature of qualitative and quantitative strategies within and arguments for a mixed methodology paradigm have been summarised by Duffy (1987) and Bowen (1996) as follows:

- By omitting qualitative methods, many phenomena that occur within the context of the setting may be overlooked (Shaddish, Cook, & Leviton, 1991);
- Quantitative measurements are based on qualitative assumptions about which constructs are worth measuring and how they are conceptualised (Campbell & Fiske, 1959);
- Omitting quantitative methods can lead to missing important casual relationships between variables as well as quantification and analysis of those variables to determine statistical probabilities (Caracelli & Greene, 1993; Madey, 1982);
- While quantitative designs control for bias so that facts can be understood in an objective way, the qualitative approach aims to understand the perspective of program stakeholders through observation and experience data (Madey, 1982);
- Quantitative methodology addresses the accumulation of facts and causes of behaviour, while qualitative methodology addresses concerns with the changing and dynamic nature of reality (Patton, 1990; Reichardt & Rallis, 1994);
- Quantitative research designs strive to identify and isolate specific variables within the context (seeking correlation, relationships, causality) of the study as the qualitative design focuses on a holistic view of what is being studied (via documents, case histories, observations and interviews) (Caracelli & Greene, 1993; Morse, 1991);
• By combining methods, the advantages of each methodology complement the other making a stronger research design with resulting more valid and reliable findings. The inadequacies of individual methods are minimised and more threats to internal validity are realised and addressed. (Bowen, 1996); and

• Both quantitative and qualitative research designs seek reliable and valid results. Data that are consistent or stable as indicated by the researcher's ability to replicate the findings is of major concern in the quantitative arena while validity of the qualitative findings is paramount so that data are representative of a true and full picture of constructs under investigation (Shaddish et al., 1991).

5.4 Research Design

The application of a mixed methodology approach to the research question: What is the most effective educational strategy to use in a workplace situation to induce voluntary behaviour change to more environmentally sustainable transport modes? resulted in the design of three interventions which, while maintaining the same informational content, spanned the range of involvement and ownership of learning process from low to high. Table (5.4.1) outlines the basic structure of the three interventions with increasing level of involvement but including the same information content.
Table 5.4.1  Research design : intervention table.

<table>
<thead>
<tr>
<th>Group: educational strategy</th>
<th>Treatment Given</th>
<th>Treatment Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Least Complex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surface learning</td>
<td>A) Information</td>
<td>Poster Display Brochures</td>
</tr>
<tr>
<td>Top down motivation</td>
<td></td>
<td>Newsletters Lunchtime</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Speakers</td>
</tr>
<tr>
<td>Most Complex</td>
<td>B) Environmental leadership</td>
<td>Group 1 plus Environmental</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Leader in the workplace</td>
</tr>
<tr>
<td></td>
<td>C) Involvement (Green Transport Plan)</td>
<td>Group 2 plus Workplace</td>
</tr>
<tr>
<td></td>
<td></td>
<td>steering committee engaged</td>
</tr>
<tr>
<td></td>
<td></td>
<td>in problem solving</td>
</tr>
</tbody>
</table>

5.5  Intervention design

The three programs (or interventions) each contained the same basic structure with a pre intervention stage (recruitment, benchmark survey), intervention (introduction, four one month green transport promotion periods) and post intervention (program conclusion, second survey), with a total duration of 9 months. The four periods of green transport promotion (walking, cycling, public transport, carpooling) in all interventions involved participants the most, but planned activities such as guest speakers and workshops were scheduled over the lunch hour in order to avoid encroaching on employees' work time. The way in which information was communicated was an important aspect of the interventions. The program aimed to create a feeling of value - that employees' choices were valued because their contribution to air quality was significant. In addition the program aimed to avoid provocation of negative feelings such as guilt or defensiveness that may be associated with the challenge to participants’ current behaviour. The three different interventions are outlined below and examples of the program schedule and some materials are provided in Appendices XIV and XV.
Intervention 1 (abstract, generic, least self-regulation facilitated) provided individuals with information through a 4m x 3m display of posters, a series of guest speakers and publications, which were usually distributed through the workplaces' internal mail. The motivation to read the information, attend sessions, and learn about green transport options was left to the employee. There was no additional support provided and there were no other incentives provided. Intervention 1 aims to increase knowledge in the expectation that the desired behaviour will increase. The intervention structure assumes that the employees are self-regulated learners, therefore makes no provision to involve participants in activities to encourage the development of self-regulated learning.

Intervention 2 provided the same information as in intervention 1, but also provided a volunteer environmental leader in the workplace for three hours each week during the entire program. The environmental leader, or volunteer, could help the employees by gathering information specific to their situation and bringing it to the workplace, and supported the employees in their efforts to examine and reflect on their current transport behaviour. This provided individuals with the opportunity to address their transport concerns and issues with support from the environmental leader, and encouraged discussion of the barriers to changes in behaviour. Intervention 2 provided additional opportunities for individuals to reflect and explore their own behaviour and identify the benefits of a change in behaviour. It also encouraged participants to take control of barriers impacting their behaviour in order to overcome those obstacles. This encouraged the use of strategies such as reflection and goal setting which are common in self-regulated learners.
Intervention 3 maintained the information and environmental leader components of intervention 2, but additionally incorporated a green transport planning process. The green transport planning process required a high level of employee participation and encouraged employees to address alternative transport issues which concerned them. Intervention 3 provided opportunities for employees to engage with the issues, learn about the barriers and become empowered to act on removing them. The level of ownership provided to the workplace aims to encourage an active approach to taking responsibility for workplace transport behaviour.

5.6 Participants

Workplaces

Up to 10 workplaces of 100 employees, or a total number of 1 000 employees were expected to participate in each year of the research. Workplace participation was limited by funding, time, resources and availability of willing participants.

Workplaces were recruited by invitation. Letters of invitation were sent to the chief executive officer, or equivalent, of 50 workplaces in the Perth Central Area inviting them to participate in the program (Appendix II). These letters were followed up by telephone calls asking if the correspondence had been considered and if a decision had been made. Once a commitment from the administrative section of the workplace was confirmed, a registration letter and form (Appendix III and IV) was sent to the liaison officer, and an explanation of the program was distributed to all employees in the workplace.
Each workplace participating in the research was examined closely in an attempt to describe as many of the individual characteristics as possible. Variables within each workplace include structure and decision-making processes, organisational culture, environmental policy, transport resources, attitude and support for alternative transport use, and perceived effectiveness of the program. A case study file was collated for each participating workplace over the duration of its involvement, which allowed the researcher to develop a profile for each workplace. The files contained annual reports, structural data, employee numbers, responses to a brief questionnaire completed by the workplace representative (Appendix IV), along with copies of any correspondence between the workplace and the program coordinator. This enabled a clear record and analysis of the ‘between workplace’ variables.

Workplaces which participated in the research each completed one of the three TravelSmart Workplace interventions designed to increase employees’ use of alternative transports. The treatment types (table 5.4.1) varied according to the level of collaboration amongst staff, the level of responsibility of volunteers in developing and maintaining programs, and the structure of participating workplaces. This variation cannot be avoided due to the naturalistic nature of the research (the participating workplaces cannot be manipulated), and contributes to the suitability of a mixed methodology approach.

The research involved a total of 13 workplaces and approximately 4 000 employees. Three different programs were implemented and workplace types were matched as closely as possible to maintain fairness of comparison. Of the original workplaces, one withdrew early in the program due to restructuring and a large number of
redundancies, and another did not return any completed second questionnaires so quantified measurement of change could not occur. The remaining 11 workplaces consisted of four government workplaces, four engineering workplaces, one accounting/ stock exchange firm, one health/medical research workplace and one local government authority (table 5.6.1). Two of these workplaces completed the first type of intervention, five completed the second type of intervention, and four completed the third type of intervention.

Table 5.6.1 Summary of participant workplaces and treatment type.

<table>
<thead>
<tr>
<th>Intervention A Workplaces</th>
<th>Intervention B Workplaces</th>
<th>Intervention C Workplaces</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td>Description</td>
<td>Code</td>
</tr>
<tr>
<td>7</td>
<td>Government (400)</td>
<td>2</td>
</tr>
<tr>
<td>1</td>
<td>Engineering (350)</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>Marketing (withdrew)</td>
<td>6</td>
</tr>
<tr>
<td>8</td>
<td>Engineering (withdrew)</td>
<td>5</td>
</tr>
<tr>
<td>13</td>
<td>Government (300)</td>
<td></td>
</tr>
</tbody>
</table>

Of these workplaces, six were chosen for closer examination (highlighted in table 5.6.1) as they provided the opportunity to compare two similar style workplaces (government or engineering) across the three interventions.

Employees

After a commitment to participate was obtained from the workplace management and introductory information had been distributed throughout the organisations, a baseline survey was sent to each individual employee within the workplaces.

Employee participation in the program was voluntary, and as a result the employees
who responded to both the baseline survey and the post intervention survey were by default the selected sample of individuals within the workplace. This process is open to potential attrition bias as there is a possibility that the employees who respond are those more likely to participate in other activities also, such as trying an alternative transport. However, the necessarily voluntary nature of the research for ethical reasons cannot overcome this problem. This issue will be further discussed in the questionnaire methodology section (sections 5.9 and 5.10).

**Environmental leaders/ mentors**

Environmental leaders were involved in the coordination of the interventions within the participating workplaces and were the primary contact for employees. Environmental leaders were selected from undergraduate students within Murdoch University using a standard job application procedure. The voluntary positions were advertised through university work experience programs and during lectures. Interested students completed applications addressing selection criteria (Appendix V). Communication skills were considered the most important factor in student selection because the primary role of the student within the workplace was to open communication channels with the employees. Students who were further through their degree, or had more highly developed communication skills, were selected and attended a training session designed to prepare them for their role in the program, and ensure all volunteers would be close to the same level of confidence and skill to reduce variation in the service provided to different workplaces. In addition to the training, the researcher developed close working relationships with each of the environmental leaders. Weekly communication about events and situations in the
workplaces as well as the provision of advice, support and instructions formed the basis of these relationships.

**Researcher**

The researcher was responsible for the recruitment of workplaces and the ongoing coordination and development of the TravelSmart Workplace program. This role necessarily resulted in a close working relationship with administrators in each of the participating workplaces, and with each of the environmental leaders. Weekly communication about events and situations in the workplaces as well as the provision of advice, support and instructions formed the basis of these relationships. In addition, responding to participants questions or comments directly through email or phone conversations meant there was also some interaction between the researcher and individual employees in participating workplaces. The researchers observations and experiences throughout the intervention periods were recorded in a research journal. Observations included descriptions of workplaces, records of organizational changes, comments and stories told by participants, as well as a record of problems or issues which arose throughout the program.

### 5.7 Data collection & measurement methodologies

A major strength of a mixed methodology approach to data collection is the opportunity to use many different sources of evidence (Trochim, 1982; Yin, 1994). The design chosen for this research allowed for description followed by exploration of transport behaviour and change in each participant workplace. The data for each workplace could then be collated and compared post intervention. Both qualitative
and quantitative comparison of relative effectiveness of different interventions on participating workplaces can be documented using this ‘case study’ style methodology. Workplace characteristics which may influence the success of an intervention were able to be documented and used in unstructured data analysis. The quantitative data used in this research were collected using a pre and post intervention questionnaire. Qualitative data were collected from a range of sources including participant and direct observation, focus groups and interviews, archival records, documentation and questionnaires. The sources of data and the method of analysis used are each examined in more detail below.

5.8 Qualitative data collection and analysis

Focus Groups and Interviews

Focus groups and interviews allow for in depth qualitative exploration of results from the questionnaires, perceptions of program effectiveness and examination of contradictions in belief and behaviour (Krueger & Casey, 2000). Open ended interviews provide the opportunity to ask about facts and opinions about events, or even propositions and insights while focused interviews can still be open ended in nature but generally follow a certain set of questions derived from the case study protocol (Yin, 1994). This research employed the latter approach with a standard set of focused questions used to interview individuals and for focus group style group interviews. The questions focused on the participants’ views on the program effectiveness, but encouraged participants to elaborate and contribute any views they felt relevant. The interview and focus group schedules are shown in Appendices VII, VIII, IX and X. Interviews of one to two employees were conducted in each
workplace one year after the conclusion of the intervention. Focus groups were conducted at the conclusion of the intervention in some workplaces, as not all workplaces were willing to allow staff the time to participate in a focus group.

A focus group was also conducted with each group of volunteer environmental leaders at the conclusion of the intervention in order to compare experiences and perceived success in the workplaces from the external or participant observer point of view. A participant observer can assume a variety of roles within a case study type situation and may actually participate in the events being studied (Yin, 1994). As a result the observations possible can contribute significantly to understanding the processes occurring in the observed group.

At the conclusion of the program the interview and focus group responses were entered into the Qualitative Research and Solutions program NUD*IST (Non-numerical Unstructured Data* Indexing Searching and Theorising), a package designed to support processes of coding data into an index system which can then be used to explore and analyse the variety of responses (Richards, 1998).

**Documentation and Archival Records**

A large amount of documentation was collected during the coordination of the TravelSmart programs. In case study and mixed methodology research, documents can be used to corroborate and augment evidence from other sources, or to clarify inferences and provide insight into the background to direct observations (Yin, 1994). Documentation collected included letters, memoranda, agendas, announcements, minutes of meetings, written reports of events, administrative
documents, proposals, progress reports, other internal documents, newspaper clippings and other media articles, and researcher records such as diaries, calendars, participant lists and telephone listings. All documentation relating to the coordination and development of the TravelSmart Workplace program, or to the participant workplaces, was collated and at the conclusion of the interventions was sorted into files for future reference. The intention was to enter all relevant data into the NUD*IST program along with interview and focus group data, in order to develop a more complete and in depth understanding of each workplace.

5.9 Quantitative data and analysis methodology

Questionnaire/instrument

The use of questionnaire methodology allowed large scale collection of specific information such as reasons behind transport mode choice and demographic information. Pre and post intervention questionnaires (Appendix XI) were used to benchmark and measure changes in quantitative variables. The questionnaire included scales designed to assess knowledge, attitude to air pollution and transport issues, environmental attitude, self-efficacy, behavioural intention, and commute trip mode use along with questions recording demographic data, workplace arrangements, stages of change, and reasons for current mode choice. The knowledge and attitude 1 scales were taken from a survey designed for a trial program by Marshall (1998b). The Attitude 2 scale was the well used and validated New Environmental Paradigm scale developed by Dunlap and Van-Liere (1978). The measurement of commute trip mode was made by a longitudinal panel survey which required participants to record the form of transport used to get to and from work for
five consecutive days. The scales measuring psychological constructs are summarised in table 5.9.1.

Table 5.9.1 Details of questionnaire scales.

<table>
<thead>
<tr>
<th>Construct</th>
<th># Items</th>
<th>Scale responses</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge</td>
<td>14</td>
<td>True/False</td>
<td>(Marshall, 1998b)</td>
</tr>
<tr>
<td><em>Measuring knowledge pertaining to car use and air quality issues.</em></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attitude 1</td>
<td>9</td>
<td>Strongly Agree, Agree, Disagree, Strongly Disagree, Don’t Know</td>
<td>(Marshall, 1998b)</td>
</tr>
<tr>
<td><em>Measuring attitudes toward air quality and car use issues.</em></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attitude 2</td>
<td>9</td>
<td>Strongly Agree, Agree, Disagree, Strongly Disagree, Don’t Know</td>
<td>(Dunlap &amp; Van-Liere, 1978)</td>
</tr>
<tr>
<td><em>Measuring environmental attitudes using the New Environmental Paradigm scale.</em></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environmental Behaviour</td>
<td>6</td>
<td>Never, Rarely, Sometimes, Regularly, Always</td>
<td>(Baudains, 1998)</td>
</tr>
<tr>
<td><em>Measuring reported level of participation in environmental behaviours such as recycling and energy conservation.</em></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Efficacy</td>
<td>6</td>
<td>Strongly Agree, Agree, Disagree, Strongly Disagree, Don’t Know</td>
<td>Constructed for this study</td>
</tr>
<tr>
<td><em>Measuring how able or empowered to use alternative transport participants feel.</em></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The second questionnaire also included a small feedback section for evaluation of aspects of the TravelSmart program. The pre intervention questionnaires were distributed to every employee in each participating workplace through the internal mail, and the second questionnaires were mailed only to the employees who returned the first questionnaire which allowed the measurement of change in variables in a matched sample. Analysis of the instrument for validity is presented in chapter 6.
5.10 Measuring transport behaviour change: ‘Before & After’ surveys

The TravelSmart Workplace (TSW) program survey sample, consisting of the employees within the participating workplaces, was invited to complete a first questionnaire. A 40% response rate was obtained for the first survey. At the completion of the TSW program only the employees who completed the first survey were invited to respond to a second survey. A response rate of approximately 60% was achieved resulting in matched data obtained for slightly more than a quarter of the original population.

Richardson (2002) reports that in identifying changes in behaviour, a longitudinal panel survey is the preferred option as it eliminates the between-sample variance. This enables statistically significant changes to be identified with a smaller sample size in the before and after surveys (A. J. Richardson, 2002). The major problem with a longitudinal panel survey, however, is the reduced response rate, especially in the ‘after’ survey. If this ‘attrition’ between the before and after surveys is a function of the parameters to be measured (e.g. do participants who don’t change their behaviour drop out of the ‘after’ survey because they are aware they did not achieve the target behaviour), then adjustments must be made for this ‘attrition bias’ before concluding that behaviour change has been achieved (A.J. Richardson, 2002; A.J. Richardson, Ampt, & Meyburg, 1995).

The problem of measuring the success of TravelSmart Workplace is one that has been the focus of varying opinions and academic approaches. Recent panel surveys in Germany surveying travel behaviour of households over more than one week have shown that the inherent intra-personal variability in daily travel patterns from one
day to another and from one week to the next is so big that it is difficult to statistically disentangle the inherent variability of behaviour from policy induced behaviour change. That affects the sample size for a before and after survey which then needs to be big enough to be able to separate both effects (Axhausen, Zimmermann, Schönfelder, Rindsfüser, & Haupt, 2002).

Essentially, while the before and after survey approach avoids between-sample variability, it reduces the original sample size due to non-responsive participants. This becomes a problem when the sample has a limited size to begin with – such as the size of a workplace, which is then reduced further through survey non-response, particularly when dealing with a behaviour which has a large natural variation such as transport mode use (A.J. Richardson, 2002; A.J. Richardson et al., 1995).

5.11 Psychological variables: Rasch theory, modeling & measurement

The principles of psychological measurement were first outlined by Thurstone in the 1920’s (Thurstone, 1927, 1928a, 1928b, 1929). The fundamental observational frameworks of Thurstone are ‘constant’ and ‘paired comparison’ methods while the various response models are based on the normal Gaussian function. Thurstone’s formulations are the basis for the most common response processes and models for measurement in the social sciences (Andrich, 1999).

Thurstone’s work was built on by a number of mathematicians and modelers including Rasch (1960) who produced a working model that allowed individuals and instrument items to be placed on a continuum of probable relativity. Due to "the validity of a separability theorem (due to sufficiency): It is possible to arrange the
observational situation in such a way that from the responses of a number of persons to the set of items in question we may derive two sets of quantities, the distributions of which depend only on the item parameters, and only on the personal parameters, respectively. Furthermore the conditional distribution of the whole set of data for given values of the two sets of quantities does not depend on any of the parameters”.

(Rasch, 1960, p.122).

Andrich (1978a; Andrich) has shown that Rasch's separability requirement leads to the conclusion that the necessary and sufficient distribution for constructing measures from discrete observations is Poisson (Andrich, 1995, 1996). The natural parameter for this Poisson is the ratio of the location of the object and the measurement unit of the instrument in question. This formulation preserves concatenation and divisibility and also the generality requirement that measurement in different units always implies the same location (Wright, 1997). The Rasch Unimetric Models for Measurement program (RUMM) uses this work to provide an interactive modeling program capable of accepting and analysing raw data such as that collected using the questionnaire in this research (Andrich, Sheridan, & Luo, 2000).

The models used for analysing responses in this research are termed cumulative and are based on the assumption that there is an ‘ideal direction’ in responses, so that ‘more is better’ (Andrich, 1999). It is expected that the more positive the attitude, the more likely a particular response will be. In other words, “A person having a greater ability than another should have the greater probability of solving any item of the type in question, and similarly, one item being more difficult than another one
means that for any person the probability of solving the second item correctly is the greater one” (Rasch, 1960, p.117). For example, the responses may be Disagree (D) or Agree (A) which are scored 0 and 1 respectively. Then, the greater the probability of the Agree response (scored 1), and the higher the score across one statement, the more positive the inferred attitude (Hatwell, 2000).

The data from the pre and post questionnaire knowledge, attitude 1 and 2, efficacy and environmental behaviour were entered into the RUMM program. The data were then used to test the validity of the scales (see chapter 7.1), and to provide estimates of the locations of participants before and after the intervention. These locations were then entered into the Statistical Package for the Social Sciences (SPSS) program where they could be tested with the demographic variables using analysis of variance (Kinnear & Gray, 2000).

5.12 Analysis and Research Questions

As outlined in chapter 1, the research question can be broken down into three main sub-questions.

1) Which intervention strategy of information, leadership or involvement, is most successful?

2) Do workplace characteristics influence intervention success?

3) Is there a relationship between transport behaviour and other measurable psychometric variables (attitude, knowledge, empowerment)?

The analysis followed the research questions, with initial examination of the data focusing on comparing the scores and RUMM locations of participants’ knowledge,
attitude, behaviour and empowerment to determine if any significant change had occurred in these variables between the pre and post questionnaire. The secondary analysis incorporated comparison of these scores across workplaces as well as across intervention. Finally, a more detailed examination of the relationship between attitude, knowledge and behaviour was completed. The results of this analysis are presented in chapter 8.
Chapter 6

Validation of Questionnaire

The purpose of this chapter is to examine the questionnaire in order to validate its effectiveness as a measurement instrument and determine if there was a need to make any significant changes to items and scales within the questionnaire.

It is important that the measurement of the variables is effective, that is, both valid and reliable. Therefore the questionnaire needs to be examined to determine if the items are, in fact, measuring the construct, and to determine if the responses fit the chosen measurement model.

The questionnaire was designed to evaluate the effectiveness of different environmental behaviour change strategies in a workplace situation. In order to determine if change occurred the questionnaire was used before and after particular strategies were implemented. The questionnaire contained four scales intended to measure:

- Knowledge (air pollution and vehicle use issues) (K items);
- Attitudes (to the environment, air pollution, and to use of motor vehicles) (A items);
- Self-efficacy (E items); and
- General environmental behaviour (B items).

In addition, separate items were included to obtain demographic information. The questions are listed in Appendix XI.
Three of the scales use Likert style response categories, and measured the affective components of responses to air pollution, general environmental attitudes and self-efficacy. The fourth scale consists of a dichotomous (true/false) measure of knowledge. All four variables appear to be cumulative in nature and hence a cumulative response model of analysis was chosen. Details of the model are presented later in this chapter.

Data collection

The questionnaire was distributed to every employee in the 13 participating workplaces from the Perth central business district, a total of 2 000 individuals using employee name lists provided by the human resources section of each workplace. A total of 790 questionnaires were returned over a period of three weeks, a response rate of approximately 40%. No follow up of employees who had not returned surveys was attempted. Once the completed surveys were received the data were entered into a spreadsheet, from which the raw scores could be formatted for use in RUMM2010 program (Andrich et al., 2000), which enabled analysis with Rasch unidimensional models for measurement.

6.1 Analysis of four scales combined

Duncan (1985) suggests that instead of being representative of different dimensions of a construct, latent traits such as attitudes and overt behaviours could be conceptualised as manifestations of the same underlying construct but at different levels of intensity. If this is so the different traits of knowledge, attitude, behaviour and efficacy pertaining to the same underlying construct of air quality and transport use could be expected to exist at different points on the same continuum (Styles,
In order to determine the sense of coherency between the constructs included in this research the first analysis of the questionnaire was run as a combination of all the scales with all items in the questionnaire included. The total item trait interaction chi square with 405 degrees of freedom for the analysis was high (8975.99), and the overall test of fit chi square probability of 0.000 suggests some mis-fitting items.

**Item fit**

Viewing the items in order of location in logits (table 6.1.2) there are items from the knowledge, attitude and behaviour scales across the range of item locations, although at the ‘difficult’ end of the continuum there are mostly K (knowledge) items which suggests that relative to the other scales, knowledge is more difficult on the whole, while attitude items tended to be easier than both the behaviour and knowledge. Each scale has been coloured differently in table 6.1.1 to highlight this spread across the continuum. Examining the chi square probability it can be seen that almost all of the items have an extremely low probability of 0.000. In large sample sizes such as this (2 258) test of fit statistics can often be influenced, so it is suggested that an adjusted sample size be considered for the chi square and probability statistics. A generally accepted figure for re-calculating fit statistics is a sample of 40 to 50 persons per item. In RUMM it is possible to calculate an adjusted chi square fit statistic and probability by nominating a new sample size (Hagquist, 2001). Due to the large sample size this procedure will be adopted for examination of the scales.

Viewing the items in order of the adjusted chi square probability values (table 6.1.1), it can be seen that most items do not fit well despite low chi square and residual test
K11

0.046 -0.295 2200.99

11.76 0.227

A13

0.031

2.529 1701.48

13.03 0.161

10.399

A17

0.031

2.874 1955.14

13.52 0.140

10.788

A18

0.033

2.652

16.64 0.054

13.282

1968.8

9.387

K2

0.05

2.91 2200.99

17.4 0.043

13.883

K5

0.048

1.829 2200.99

21.19 0.012

16.907

K7

0.046

1.107 2200.99

21.86 0.009

17.441

K9

0.053

2.991 2200.99

24.11 0.004

19.237

K1

0.044

0.665 2200.99

A5

0.036

K3
K13

24.09 0.004

19.222

2012.7

24.41 0.004

19.479

0.043

5.276 2200.99

28.94 0.001

23.092

0.132

1.336 2200.99

29.72 0.000

23.714

0.07

1.265 2200.99

31.50 0.000

25.135

K12

0.053

0.736 2200.99

33.51 0.000

26.738

A4

0.043

0.804 2153.19

35.60 0.000

28.405

K4

0.044

5.865 2200.99

35.55 0.000

28.367

K8

0.148

0.901 2200.99

37.65 0.000

30.045

E1

0.041 -4.088 2147.34

183.38 0.000

146.32

A9

0.041 -2.799 2142.46

230.39 0.000

183.82

A12

0.039 -1.385 2126.85

120.49 0.000

96.135

A10

0.036

62.53 0.000

49.897

A1

0.036

0.067

55.33 0.000

44.152

A11

0.034

0.575 2034.16

49.98 0.000

39.879

E3

0.054 -0.305 1404.89

123.13 0.000

98.244

A6

0.037 -2.107

2088.8

306.48 0.000

244.53

A8

0.038 -1.216 2098.55

260.03 0.000

207.48

A14

0.036

0.394 2039.04

B2

0.027

A3

0.037

B6
B4

K6

2.54

-0.4 2043.92
2124.9

52.02 0.000

41.508

4.039 2185.38

65.76 0.000

52.473

-0.36 2114.16

142.67 0.000

113.83

0.026

6.113 2186.36

105.17 0.000

83.914

0.026

3.817 2182.46

43.24 0.000

34.507

E6

0.037

0.757 2081.97

117.34 0.000

93.625

E4

0.035

1.627 2105.38

65.42 0.000

52.203

A15

0.036

1.523 1944.41

45.85 0.000

36.583

A2

0.031 -2.045 2097.58

293.67 0.000

234.32

E5

0.033

2.179 2158.07

K10

0.045

0.34 2200.99

40.88 0.000

32.62

0.03 -2.538 2094.65

226.66 0.000

180.85

4.215 2181.48

85.02 0.000

67.836

0.02 10.416 2184.41

255.28 0.000

203.69

A7
B3
B1

0.025

54.67 0.000

43.627

Location
(logits)

Item

Probability

Table 6.1.2 Location order.
Adjusted

Adjusted
Chi

Probability

Chi
Sqare

Degrees
Freedom

Residual

Standard
Error

Item

Table 6.1.1: Items in adjusted probability order, and ,

0.402 9
0.319 9

K6

3.136

K12

2.253

0.291 9
0.150 9

K5

1.814

K7

1.638

0.127 9
0.050 9

K11

1.627

K14

1.133

0.042 9
0.023 9

A16

1.086

GC

0.795

0.023 9
0.021 9

B5

0.751

K3

0.734

0.006 9
0.005 9

K1

0.458

K4

0.422

0.003 9
0.002 9

E2

0.393

B1

0.292

0.001 9
0.001 9

B3

0.291

A13

0.287

0.000 9
0.000 9

A7

0.277

K10

0.175

0.000 9
0.000 9

A17
E5

-0.018

0.000 9
0.000 9

A18

-0.095

0.000 9
0.000 9

A15

-0.189

E4

-0.205

0.000 9
0.000 9

E6

-0.286

B4

-0.299

0.000 9
0.000 9

K2

-0.337

B6

-0.359

0.000 9
0.000 9

A3

-0.361

B2

-0.364

0.000 9
0.000 9

A14

-0.374

A8

-0.399

0.000 9
0.000 9

A5

-0.416

A6

-0.451

0.000 9
0.000 9

E3

-0.476

K9

-0.522

0.000 9
0.000 9

A11

-0.637

A1

-0.687

0.000 9
0.000 9

A10

-0.778

A12

-0.807

0.000 9
0.000 9

A9

-0.837

E1

-1.209

A4

-1.501

K13

-2.846

K8

E2

0.027

0.317 2105.38

82.98 0.000

66.209

B5

0.022

5.922 2179.53

110.84 0.000

88.44

GC

0.004 14.351 2200.99 5181.65 0.000

4134.3

A16

0.035

1.862 1933.67

58.29 0.000

46.513

0.000 9
0.000 9

K14

0.044

9.299 2200.99

136.20 0.000

108.68

0.000 9

A2

0.16

-0.18

-3.09

130


of fit statistics, but there are some items which do fit well. Items E1, A9 and A7 have high negative residual and large chi square test of fit statistics which suggests they over-discriminate. Items GC and B1 do not fit the model well either, with large chi square and large positive residual test of fit statistics, indicating poor discrimination. The best fitting item was K11, with low log residual and chi square fit statistics, and a good probability of 0.4.

The analysis showed a generally poor fit of the data to the model as most items had large log residual test of fit and chi square statistics. Item GC is the worst fitting item with an extremely high chi square and residual value. Altogether there are 39 of the 45 items (11%) with very low chi square probability therefore fitting the model poorly, which is above the acceptable 5% margin of chance. If all the items fit well, it would be possible to say that all the scales are measuring the same latent trait at that level of scale, such as commitment to improving air quality, but as there are a number of misfitting items this does not appear to be true. Despite this, the item-person interaction is good, and a person separation index of 0.857 was obtained. Table 6.1.3 shows the summary statistics for the item-person interaction.

Table 6.1.3  Item-person interaction of four scales combined.

<table>
<thead>
<tr>
<th></th>
<th>ITEMS</th>
<th>PERSONS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Location</td>
<td>Fit Residual</td>
</tr>
<tr>
<td>Mean</td>
<td>0.000</td>
<td>1.923</td>
</tr>
<tr>
<td>SD</td>
<td>1.116</td>
<td>3.476</td>
</tr>
<tr>
<td>Correlation</td>
<td></td>
<td>0.084</td>
</tr>
<tr>
<td>Complete data DF =</td>
<td>0.976</td>
<td></td>
</tr>
</tbody>
</table>

The research questions outlined in chapter 1 address the relationships between mode choice and the four variables this scale focuses upon, rather than conceptualising
them as representing a single variable. As a result it is better to consider each of the four scales separately from this point forward.

6.2 Analysis of Knowledge Scale

Analysis of the 14 knowledge items as a separate scale resulted in an improved total item Chi square of 960.91 with 126 degrees of freedom. However, the overall item trait interaction Chi square test of fit probability of 0.000 indicates that not all the items fit well. A closer examination of items for fit to the model is necessary to determine the fit of the data to the model.

Item fit

The spread of the items across the location continuum in logits is as expected with a number of difficult items, a few easy items, and a range of items between. Viewing the items in location order (table 6.2.2) indicates that items K8 and K13 were the easiest, and item K6 was the most difficult, followed by K12. These results are as expected, with the questions’ content ranging from general knowledge to more specific knowledge (Appendix XI).

Viewing the items in order of adjusted probability (table 6.2.1) shows that 9 of the 14 items fit the model well, but there are a few items that do not fit well. Some of these items are examined in more detail below to determine what may be causing the poor fit of the items to the model.
Table 6.2.1 Knowledge items in residual order, Table 6.2.2 Location order.

<table>
<thead>
<tr>
<th>Item</th>
<th>Standard Error</th>
<th>Residual</th>
<th>Degrees Freedom</th>
<th>Chi Square</th>
<th>Probability</th>
<th>Adjusted Ch Square</th>
<th>Adjusted probability</th>
<th>Degrees Freedom</th>
</tr>
</thead>
<tbody>
<tr>
<td>K5</td>
<td>0.052</td>
<td>0.854</td>
<td>2067</td>
<td>19.69</td>
<td>0.019</td>
<td>4.421</td>
<td>0.882</td>
<td>9</td>
</tr>
<tr>
<td>K8</td>
<td>0.139</td>
<td>0.292</td>
<td>2067</td>
<td>19.91</td>
<td>0.018</td>
<td>4.472</td>
<td>0.878</td>
<td>9</td>
</tr>
<tr>
<td>K12</td>
<td>0.056</td>
<td>0.756</td>
<td>2067</td>
<td>20.70</td>
<td>0.014</td>
<td>4.649</td>
<td>0.864</td>
<td>9</td>
</tr>
<tr>
<td>K7</td>
<td>0.051</td>
<td>-1.261</td>
<td>2067</td>
<td>25.60</td>
<td>0.002</td>
<td>5.748</td>
<td>0.765</td>
<td>9</td>
</tr>
<tr>
<td>K13</td>
<td>0.118</td>
<td>-0.385</td>
<td>2067</td>
<td>27.51</td>
<td>0.001</td>
<td>6.177</td>
<td>0.722</td>
<td>9</td>
</tr>
<tr>
<td>K4</td>
<td>0.05</td>
<td>-2.159</td>
<td>2067</td>
<td>29.16</td>
<td>0.001</td>
<td>6.547</td>
<td>0.684</td>
<td>9</td>
</tr>
<tr>
<td>K2</td>
<td>0.055</td>
<td>-0.293</td>
<td>2067</td>
<td>29.64</td>
<td>0.001</td>
<td>6.656</td>
<td>0.673</td>
<td>9</td>
</tr>
<tr>
<td>K6</td>
<td>0.07</td>
<td>-0.591</td>
<td>2067</td>
<td>30.83</td>
<td>0.000</td>
<td>6.924</td>
<td>0.645</td>
<td>9</td>
</tr>
<tr>
<td>K3</td>
<td>0.049</td>
<td>-1.327</td>
<td>2067</td>
<td>31.91</td>
<td>0.000</td>
<td>7.165</td>
<td>0.620</td>
<td>9</td>
</tr>
<tr>
<td>K14</td>
<td>0.049</td>
<td>7.228</td>
<td>2067</td>
<td>98.09</td>
<td>0.000</td>
<td>22.024</td>
<td>0.009</td>
<td>9</td>
</tr>
<tr>
<td>K10</td>
<td>0.051</td>
<td>-5.538</td>
<td>2067</td>
<td>100.95</td>
<td>0.000</td>
<td>22.666</td>
<td>0.007</td>
<td>9</td>
</tr>
<tr>
<td>K1</td>
<td>0.049</td>
<td>-4.907</td>
<td>2067</td>
<td>100.96</td>
<td>0.000</td>
<td>22.668</td>
<td>0.007</td>
<td>9</td>
</tr>
<tr>
<td>K11</td>
<td>0.051</td>
<td>-6.394</td>
<td>2067</td>
<td>135.76</td>
<td>0.000</td>
<td>30.481</td>
<td>0.000</td>
<td>9</td>
</tr>
<tr>
<td>K9</td>
<td>0.055</td>
<td>6.458</td>
<td>2067</td>
<td>290.15</td>
<td>0.000</td>
<td>65.144</td>
<td>0.000</td>
<td>9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Item</th>
<th>Loc'n</th>
</tr>
</thead>
<tbody>
<tr>
<td>K8</td>
<td>-4.063</td>
</tr>
<tr>
<td>K13</td>
<td>-3.662</td>
</tr>
<tr>
<td>K9</td>
<td>-0.952</td>
</tr>
<tr>
<td>K2</td>
<td>-0.934</td>
</tr>
<tr>
<td>K10</td>
<td>-0.375</td>
</tr>
<tr>
<td>K4</td>
<td>-0.074</td>
</tr>
<tr>
<td>K1</td>
<td>-0.008</td>
</tr>
<tr>
<td>K3</td>
<td>0.272</td>
</tr>
<tr>
<td>K14</td>
<td>0.733</td>
</tr>
<tr>
<td>K7</td>
<td>1.354</td>
</tr>
<tr>
<td>K11</td>
<td>1.399</td>
</tr>
<tr>
<td>K5</td>
<td>1.468</td>
</tr>
<tr>
<td>K6</td>
<td>2.873</td>
</tr>
</tbody>
</table>

Item K5 was the best fitting item, with low log residual and chi square test of fit statistics. As figure 6.2.1 shows, the obtained mean scores for 10 groups or class intervals across the whole range of person estimates, are located close to the curve of expected values. This indicates that the item ‘Ozone gas is the major constituent of photochemical smog’ is a good measure of the specific knowledge being addressed by this scale, so that individuals with generally poor knowledge of air quality and car use issues will not know the correct answer while individuals with a higher level of knowledge are more likely to respond correctly.
Figure 6.2.1  Item characteristic curve for item K5.

Item K8 is also a good fit, although the item was very easy as can be seen in figure 6.2.2 below. The obtained scores for each group of people across the range of person scores are located close to the expected score curve, but the entire sample is close to an expected score of 1. That is, most people would be expected to respond correctly to this item. When considering the item, ‘Using public transport, bikes, walking or teleworking can reduce air pollution problems’ it seems sensible that this should be an easy item considering the extent to which this information has been discussed in the media in recent years.

Figure 6.2.2  Item characteristic curve for item K8.
Items K11 and K10 both fit the model poorly and obtained high Chi square and large negative log residual values. The item characteristic curve for K11 (figure 6.2.3) clearly illustrates the obtained mean scores for the ten class intervals across the whole range of person estimates forms a more vertical pattern than the expected curve, that is, the item over-discriminates. Items which over-discriminate divide the sample too sharply so that a person who scores high overall on the scale has an even greater probability of getting this correct than expected by the model and vice versa. This could indicate that specialist knowledge is required to answer this item correctly, which some individuals may not have had the opportunity to learn. The true/false item ‘Less than 25% of the nitrogen oxides in Perth’s atmosphere are produced by vehicles’ measured knowledge of the contribution of cars to the specific air pollutant nitrogen oxide.

Figure 6.2.3  Item K11 item characteristic curve.

![Item K11 item characteristic curve](image)

Items K14 and K9 also fit the model poorly, both obtaining large positive log residual and high Chi square. The item characteristic curve for K9 (figure 6.2.4) illustrates that the obtained mean scores for the ten class intervals across the whole
range of person estimates form a more horizontal pattern than the expected curve, that is, the item under discriminates. Items which under-discriminate do not clearly distinguish between individuals at different levels of knowledge, so there is no detected difference in response to this item between a person who scores high overall on the scale or low overall on the scale. The location of mean responses to the item across the ten class intervals show that people who generally score low on the knowledge scale are still agreeing with this item so it is relatively easy, but experiential knowledge could account for the non-discrimination. The item ‘Traffic congestion affects the reliability of public transport’ could be dependent on personal experience rather than researched knowledge, as it is likely that individuals across the sample would have experienced buses being stuck in freeway traffic regardless of the level of their knowledge about air quality and transport issues.

Figure 6.2.4  Item K9 item characteristic curve.

![Item K9 item characteristic curve](image)

Although these items do not fit the model as well as other items in the knowledge scale, they were retained as they are still marginally useful in the assessment of people.
Profiles of Individuals

The RUMM program also provides test of fit for individual response patterns across items. Of the 2258 sample, 29 individuals were listed as having extreme scores so a residual test of fit was unavailable for them. For this sample a fit statistic of + or - 2.5 was the margin over which fit was considered problematic. Two individuals had a log residual test of fit statistic above 2.5. Together with the 29 ‘extreme’ individuals these constituted 1.37% of the entire sample. This proportion is well within the acceptable level of 5%. Hence person fit is considered to be very good.

The responses of an individual with a residual fit statistic above 2.5 are examined in order to explain the most likely reasons for misfitting the model. Table 6.2.2 below presents the responses of individual 1548, with a residual test of fit statistic of 2.567. The responses of an individual with a good fit to the model would be expected to follow a Guttman pattern according to the difficulty of the items, although an exact fit would be considered problematic by the model for being ‘too good’. In this case however the individual has answered what should be easy items for that individual incorrectly while correctly answering some items this individual should have found difficult. These disordered responses do not represent a reliable estimate of a persons’ performance as a whole. Disordered response patterns for individual 1548 (table 6.2.2) are marked with an asterisk.
Table 6.2.2  Example of responses from individual 1548 (female, 18-40 age group, administration job, workplace Ce, time 1, intervention C) in item location order.

<table>
<thead>
<tr>
<th>Item</th>
<th>Item Locn</th>
<th>Observed Score</th>
<th>Expected Score</th>
<th>Standard Residual</th>
</tr>
</thead>
<tbody>
<tr>
<td>K8</td>
<td>-4.063</td>
<td>0</td>
<td>0.991</td>
<td>-10.447</td>
</tr>
<tr>
<td>K13</td>
<td>-3.662</td>
<td>0</td>
<td>0.987</td>
<td>-8.549</td>
</tr>
<tr>
<td>K9</td>
<td>-0.952</td>
<td>0</td>
<td>0.829</td>
<td>-2.205</td>
</tr>
<tr>
<td>k2</td>
<td>-0.934</td>
<td>1</td>
<td>0.827</td>
<td>0.458</td>
</tr>
<tr>
<td>K10</td>
<td>-0.375</td>
<td>0</td>
<td>0.732</td>
<td>-1.653</td>
</tr>
<tr>
<td>K4</td>
<td>-0.074</td>
<td>1</td>
<td>0.669</td>
<td>0.703</td>
</tr>
<tr>
<td>K1</td>
<td>-0.008</td>
<td>1</td>
<td>0.654</td>
<td>0.727</td>
</tr>
<tr>
<td>K3</td>
<td>0.272</td>
<td>1</td>
<td>0.589</td>
<td>0.836</td>
</tr>
<tr>
<td>K14</td>
<td>0.733</td>
<td>1</td>
<td>0.474</td>
<td>1.053</td>
</tr>
<tr>
<td>K7</td>
<td>1.354</td>
<td>0</td>
<td>0.326</td>
<td>-0.696</td>
</tr>
<tr>
<td>K11</td>
<td>1.399</td>
<td>0</td>
<td>0.317</td>
<td>-0.681</td>
</tr>
<tr>
<td>K5</td>
<td>1.468</td>
<td>1</td>
<td>0.302</td>
<td>1.521</td>
</tr>
<tr>
<td>K12</td>
<td>1.97</td>
<td>1</td>
<td>0.207</td>
<td>1.955</td>
</tr>
<tr>
<td>K6</td>
<td>2.873</td>
<td>1</td>
<td>0.096</td>
<td>3.07</td>
</tr>
</tbody>
</table>

**Distribution of scores and location of items**

The person/item distribution for the knowledge scale shown in figure 6.2.5 below indicates the spread of items adequately caters for most respondents with some easy items, some difficult items and a range of items in between, that is, reliability for most people is acceptable. There was a small number of individuals who fell well below the average score and were located far outside the mean item locations on the logit continuum. The reliability of measurement for these individuals is relatively poor compared with the rest of the sample because the items are not so well targeted to them.
Overall, the analysis of the knowledge scale showed a good fit of data to the model despite a few items with a poor fit. The person-item interaction is good and a person separation index of 0.756 was obtained. Table 6.2.3 shows the summary statistics for the item-person interaction.

Table 6.2.3  Item-Person interaction for knowledge scale.

<table>
<thead>
<tr>
<th>ITEMS</th>
<th>ITEMS</th>
<th>PERSONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td>Fit Residual</td>
<td>Location</td>
</tr>
<tr>
<td>Mean</td>
<td>0.000</td>
<td>-0.519</td>
</tr>
<tr>
<td>SD</td>
<td>1.972</td>
<td>3.881</td>
</tr>
<tr>
<td>Correlation</td>
<td>0.000</td>
<td>0.247</td>
</tr>
<tr>
<td>Complete data DF</td>
<td>=</td>
<td>0.928</td>
</tr>
</tbody>
</table>

The generally satisfactory result of this analysis allows the use of the knowledge scale without modification. As a measure of knowledge about air pollution and car use and the links between these issues the scale can be accepted as a reliable measurement instrument, whose items are all generally assessing a single variable.
6.3 Analysis of Combined Attitude Scale

The first analysis of the 18 attitude items as a single scale obtained a high total item Chi square of 1450.42 with 162 degrees of freedom, and a total Chi square test of fit probability of 0.000 which suggests there are some items which do not fit well.

**Item Fit**

The attitude statements range in location from –1.12 to 1.613 logits. This range in location is as expected with items designed to measure person locations across a range of levels.

Viewing the items in order of log residual test of fit (table 6.3.1 below) it can be seen that there are a few items with large negative residual values and large chi square which do not fit the model well due to over discrimination (items A9 and A6) and also items with large chi square and large positive residual values which under-discriminate (items A16 & A17).
Table 6.3.1  Combined attitude items in adjusted probability order.

<table>
<thead>
<tr>
<th>Item</th>
<th>Location</th>
<th>SE</th>
<th>Residual</th>
<th>DegFree</th>
<th>DatPts</th>
<th>Chi Sq</th>
<th>Prob</th>
<th>Adjusted Chi Sq</th>
<th>Adjusted Prob</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>-0.461</td>
<td>0.04</td>
<td>-1.526</td>
<td>2037.01</td>
<td>2168</td>
<td>19.07</td>
<td>0.000</td>
<td>6.046</td>
<td>0.735</td>
</tr>
<tr>
<td>A10</td>
<td>-0.54</td>
<td>0.04</td>
<td>-5.442</td>
<td>1959.02</td>
<td>2085</td>
<td>50.82</td>
<td>0.000</td>
<td>16.113</td>
<td>0.065</td>
</tr>
<tr>
<td>A11</td>
<td>-0.389</td>
<td>0.04</td>
<td>-4.266</td>
<td>1949.62</td>
<td>2075</td>
<td>26.95</td>
<td>0.000</td>
<td>8.545</td>
<td>0.480</td>
</tr>
<tr>
<td>A12</td>
<td>-0.512</td>
<td>0.04</td>
<td>-5.966</td>
<td>2038.88</td>
<td>2170</td>
<td>81.31</td>
<td>0.000</td>
<td>25.780</td>
<td>0.002</td>
</tr>
<tr>
<td>A13</td>
<td>0.685</td>
<td>0.03</td>
<td>3.131</td>
<td>1631.11</td>
<td>1736</td>
<td>18.07</td>
<td>0.005</td>
<td>5.730</td>
<td>0.767</td>
</tr>
<tr>
<td>A14</td>
<td>-0.087</td>
<td>0.04</td>
<td>-2.971</td>
<td>1954.32</td>
<td>2080</td>
<td>22.76</td>
<td>0.000</td>
<td>7.216</td>
<td>0.615</td>
</tr>
<tr>
<td>A15</td>
<td>0.115</td>
<td>0.04</td>
<td>-1.905</td>
<td>1863.18</td>
<td>1983</td>
<td>17.10</td>
<td>0.018</td>
<td>5.423</td>
<td>0.796</td>
</tr>
<tr>
<td>A16</td>
<td>1.613</td>
<td>0.04</td>
<td>9.14</td>
<td>1855.67</td>
<td>1975</td>
<td>445.88</td>
<td>1.000</td>
<td>141.358</td>
<td>0.000</td>
</tr>
<tr>
<td>A17</td>
<td>0.564</td>
<td>0.03</td>
<td>7.737</td>
<td>1874.46</td>
<td>1995</td>
<td>165.77</td>
<td>0.000</td>
<td>52.556</td>
<td>0.000</td>
</tr>
<tr>
<td>A18</td>
<td>0.276</td>
<td>0.03</td>
<td>5.202</td>
<td>1887.61</td>
<td>2009</td>
<td>78.43</td>
<td>0.000</td>
<td>24.865</td>
<td>0.003</td>
</tr>
<tr>
<td>A2</td>
<td>0.141</td>
<td>0.03</td>
<td>-3.807</td>
<td>2010.7</td>
<td>2140</td>
<td>53.65</td>
<td>0.000</td>
<td>17.009</td>
<td>0.049</td>
</tr>
<tr>
<td>A3</td>
<td>-0.027</td>
<td>0.04</td>
<td>-3.659</td>
<td>2026.67</td>
<td>2157</td>
<td>29.32</td>
<td>0.000</td>
<td>9.296</td>
<td>0.410</td>
</tr>
<tr>
<td>A4</td>
<td>-1.12</td>
<td>0.04</td>
<td>2.117</td>
<td>2064.25</td>
<td>2197</td>
<td>17.35</td>
<td>0.014</td>
<td>5.500</td>
<td>0.789</td>
</tr>
<tr>
<td>A5</td>
<td>-0.104</td>
<td>0.04</td>
<td>3.886</td>
<td>1930.83</td>
<td>2055</td>
<td>77.73</td>
<td>0.000</td>
<td>24.644</td>
<td>0.003</td>
</tr>
<tr>
<td>A6</td>
<td>-0.15</td>
<td>0.04</td>
<td>-7.403</td>
<td>2002.24</td>
<td>2131</td>
<td>113.83</td>
<td>0.000</td>
<td>36.089</td>
<td>0.000</td>
</tr>
<tr>
<td>A7</td>
<td>0.685</td>
<td>0.03</td>
<td>-2.108</td>
<td>2007.88</td>
<td>2137</td>
<td>47.87</td>
<td>0.000</td>
<td>15.177</td>
<td>0.086</td>
</tr>
<tr>
<td>A8</td>
<td>-0.125</td>
<td>0.04</td>
<td>-7.12</td>
<td>2011.64</td>
<td>2141</td>
<td>85.62</td>
<td>0.000</td>
<td>27.146</td>
<td>0.001</td>
</tr>
<tr>
<td>A9</td>
<td>-0.564</td>
<td>0.04</td>
<td>-7.594</td>
<td>2053.92</td>
<td>2186</td>
<td>98.82</td>
<td>0.000</td>
<td>31.331</td>
<td>0.000</td>
</tr>
</tbody>
</table>

With only a few poorly fitting items this scale shows a good fit of data to the model, and a good separation index of 0.861. The summary statistics are shown in table 6.3.2.

Table 6.3.2  Item-person interaction of four scales combined.

<table>
<thead>
<tr>
<th>ITEMS Location</th>
<th>Fit Residual</th>
<th>PERSONS Location</th>
<th>Fit Residual</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>0.000</td>
<td>Mean</td>
<td>-1.253</td>
</tr>
<tr>
<td>SD</td>
<td>0.619</td>
<td>SD</td>
<td>5.232</td>
</tr>
<tr>
<td>Correlation</td>
<td>0.000</td>
<td>Complete data DF</td>
<td>0.940</td>
</tr>
</tbody>
</table>

Complete data DF = 0.940
This fit of the data to the model was unexpected as the attitude items comprise two nine item attitude scales. The first scale measuring the construct of attitude to car use in an air pollution context, the second scale measuring general environmental attitude using items from the Dunlap and Van Liere (1978) New Environmental Paradigm scale. Despite the good quality of the attitudes as one scale, they are now examined in more detail as separate scales.

6.4 Analysis of the Attitude 1 scale: Attitude to air quality and car use

The analysis of the 9 item attitude to car use and air quality scale showed an excellent fit based on the overall Chi square test of fit probability of 1.000, with a Chi Square test of fit statistic of 861.508 at 72 degrees of freedom.

Item Fit

Viewing the items in order of residual (table 6.4.1) it can be seen that the two worst fitting items are A6 with large negative residual and large Chi square value, and A5 with large chi square and large positive residual value.
Table 6.4.1  Attitude 1 items in order of adjusted probability showing locations, log residual and Chi square test of fit.

<table>
<thead>
<tr>
<th>Item</th>
<th>Location</th>
<th>SE</th>
<th>Residual</th>
<th>DegFree</th>
<th>Chi Sq</th>
<th>Prob</th>
<th>Adjusted Chi Sq</th>
<th>Adjusted Prob</th>
<th>DF</th>
</tr>
</thead>
<tbody>
<tr>
<td>A3</td>
<td>0.17</td>
<td>0.042</td>
<td>-3.981</td>
<td>1805.36</td>
<td>20.09</td>
<td>0.000</td>
<td>2.88</td>
<td>0.942</td>
<td>8</td>
</tr>
<tr>
<td>A2</td>
<td>0.361</td>
<td>0.037</td>
<td>-7.05</td>
<td>1790.33</td>
<td>31.98</td>
<td>0.000</td>
<td>4.584</td>
<td>0.801</td>
<td>8</td>
</tr>
<tr>
<td>A7</td>
<td>1.081</td>
<td>0.037</td>
<td>-3.76</td>
<td>1787.68</td>
<td>51.89</td>
<td>0.000</td>
<td>7.438</td>
<td>0.490</td>
<td>8</td>
</tr>
<tr>
<td>A9</td>
<td>-0.532</td>
<td>0.047</td>
<td>-6.714</td>
<td>1831</td>
<td>54.07</td>
<td>0.000</td>
<td>7.751</td>
<td>0.458</td>
<td>8</td>
</tr>
<tr>
<td>A8</td>
<td>0.031</td>
<td>0.043</td>
<td>-7.549</td>
<td>1791.21</td>
<td>57.18</td>
<td>0.000</td>
<td>8.187</td>
<td>0.415</td>
<td>8</td>
</tr>
<tr>
<td>A1</td>
<td>-0.296</td>
<td>0.040</td>
<td>7.07</td>
<td>1815.08</td>
<td>100.31</td>
<td>0.000</td>
<td>14.378</td>
<td>0.072</td>
<td>8</td>
</tr>
<tr>
<td>A6</td>
<td>0.03</td>
<td>0.043</td>
<td>-8.961</td>
<td>1782.37</td>
<td>115.45</td>
<td>0.000</td>
<td>16.549</td>
<td>0.035</td>
<td>8</td>
</tr>
<tr>
<td>A4</td>
<td>-0.984</td>
<td>0.046</td>
<td>6.35</td>
<td>1840.72</td>
<td>123.81</td>
<td>0.000</td>
<td>17.747</td>
<td>0.023</td>
<td>8</td>
</tr>
<tr>
<td>A5</td>
<td>0.14</td>
<td>0.040</td>
<td>10.503</td>
<td>1722.25</td>
<td>306.76</td>
<td>1.000</td>
<td>43.97</td>
<td>0.000</td>
<td>8</td>
</tr>
</tbody>
</table>

Item A6 has a very large negative residual value of –8.961. This suggests that the item over-discriminates. The item characteristic curve (figure 6.4.1) does show a more vertical pattern than the expected curve, but it is not as extreme as might be expected for such a high residual, and the middle class intervals seem to level out.

The item statement is: ‘Car drivers should use the car less in order to reduce congestion problems’.

Figure 6.4.1  Item characteristic curve for item A6.
Item A3 reports the lowest Chi square value (20.09) so is considered the best fit. The residual value of –3.981 suggests there is some over-discrimination, but as can be seen by the item characteristic curve (figure 6.4.2) mean responses to the item across ten class intervals follow the expected value curve very closely.

**Figure 6.4.2** Item characteristic curve for item A3.

![Item characteristic curve for item A3.](image)

Item A5 with a chi square value of 306.76 and residual of 10.503 was the worst fitting item of the attitude to car use and air quality scale. The item characteristic curve (figure 6.4.3) clearly shows the level of under-discrimination with the class intervals forming a more horizontal pattern than the expected curve. This could indicate the question is encompassing a construct other than attitude to air quality and car use. It is likely the question: ‘**If convenient, employers should try to offer staff teleworking arrangements**’ is incorporating employees’ feelings about corporation responsibility in addition their own attitude to air quality, resulting in a confused response.
Profiles of individuals

Of the 2258 sample, 163 individuals (7.2%) were listed as having extreme scores so a residual test of fit was unavailable for them. Fourteen individuals (0.6%) obtained a residual fit statistic above 2.5, and 98 individuals (4.3%) obtained a residual fit statistic below –2.5. The total 4.9% of individuals with a fit statistic outside the acceptable margin is just within the 5% considered to be allowable due to chance, hence person fit is accepted as good.

Person Item Distribution

As with the combined attitude scale, the items in the scale measuring attitude to car use and air quality tend to be located on the lower end of the continuum, leaving a large proportion of the sample above the range of measured locations. Figure 6.4.4 below shows the items located between –1 and 1.5 logits, while the person distribution ranges from –2 to 6.5 logits.
Overall the analysis of the attitude 1 scale showed a good fit of the data to the model. The person-item interaction test of fit is good and a separation index of 0.864 was obtained. Table 6.4.2 shows the summary statistics for the person-item interaction.

**Table 6.4.2** Item-person interaction for attitude 1 scale.

<table>
<thead>
<tr>
<th></th>
<th>ITEMS</th>
<th>PERSONS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Location</td>
<td>Fit Residual</td>
</tr>
<tr>
<td>Mean</td>
<td>0.000</td>
<td>-1.566</td>
</tr>
<tr>
<td>SD</td>
<td>0.580</td>
<td>7.421</td>
</tr>
<tr>
<td>Correlation</td>
<td></td>
<td>0.000</td>
</tr>
<tr>
<td>Complete data DF</td>
<td>= 0.884</td>
<td></td>
</tr>
</tbody>
</table>

The major problem with this scale is the small range in location measurement (-1.0 to 1.5), while the person locations have a broader range of distribution. Despite this, the scale is an accurate measure of attitude to the car use and air quality within the range of measurement, and so was retained unmodified.
6.5  Analysis of the Attitude 2 scale: General environmental attitudes (NEP)

Analysis of the second 9 attitude items, measuring general environmental attitude, also obtained a total chi square test of fit probability of 1.000. The total item chi square test of fit statistic was 723.358 with 81 degrees of freedom.

Item Fit

Viewing the items in order of adjusted probability (table 6.5.1) it can be seen that the worst fitting item is A16 with large chi square and large positive residual value. Most other items have reasonable log residual test of fit and chi square fit statistics.

Table 6.5.1  Attitude scale 2 items in adjusted probability order.

<table>
<thead>
<tr>
<th>Item</th>
<th>Location</th>
<th>SE</th>
<th>Residual</th>
<th>DegFree</th>
<th>Chi Sq</th>
<th>Prob</th>
<th>Adjusted Chi Sq</th>
<th>Adjusted Prob</th>
<th>degF</th>
</tr>
</thead>
<tbody>
<tr>
<td>A18</td>
<td>0.083</td>
<td>0.035</td>
<td>0.466</td>
<td>1745.95</td>
<td>17.195</td>
<td>0.016</td>
<td>2.363</td>
<td>0.984</td>
<td>9</td>
</tr>
<tr>
<td>A13</td>
<td>0.506</td>
<td>0.036</td>
<td>-0.959</td>
<td>1505.68</td>
<td>24.237</td>
<td>0.000</td>
<td>3.331</td>
<td>0.950</td>
<td>9</td>
</tr>
<tr>
<td>A15</td>
<td>-0.074</td>
<td>0.038</td>
<td>-4.003</td>
<td>1724.91</td>
<td>34.733</td>
<td>0.000</td>
<td>4.773</td>
<td>0.854</td>
<td>9</td>
</tr>
<tr>
<td>A17</td>
<td>0.372</td>
<td>0.035</td>
<td>1.82</td>
<td>1733.68</td>
<td>40.642</td>
<td>0.000</td>
<td>5.585</td>
<td>0.781</td>
<td>9</td>
</tr>
<tr>
<td>A14</td>
<td>-0.295</td>
<td>0.038</td>
<td>-5.437</td>
<td>1807.34</td>
<td>47.925</td>
<td>0.000</td>
<td>6.586</td>
<td>0.680</td>
<td>9</td>
</tr>
<tr>
<td>A11</td>
<td>-0.619</td>
<td>0.037</td>
<td>-5.238</td>
<td>1802.95</td>
<td>50.213</td>
<td>0.000</td>
<td>6.901</td>
<td>0.647</td>
<td>9</td>
</tr>
<tr>
<td>A10</td>
<td>-0.753</td>
<td>0.039</td>
<td>-4.874</td>
<td>1811.72</td>
<td>53.52</td>
<td>0.000</td>
<td>7.355</td>
<td>0.600</td>
<td>9</td>
</tr>
<tr>
<td>A12</td>
<td>-0.687</td>
<td>0.04</td>
<td>-4.575</td>
<td>1885.38</td>
<td>91.727</td>
<td>0.000</td>
<td>12.606</td>
<td>0.181</td>
<td>9</td>
</tr>
<tr>
<td>A16</td>
<td>1.467</td>
<td>0.037</td>
<td>8.096</td>
<td>1721.4</td>
<td>363.17</td>
<td>1.000</td>
<td>49.908</td>
<td>0.000</td>
<td>9</td>
</tr>
</tbody>
</table>

Item A18 was the best fitting item in the Attitude 2 scale, with a chi square value of 17.195 and a residual of 0.466. As figure 6.5.1 shows, the mean responses over the 10 class intervals follow the curve of expected values very closely.
Figure 6.5.1  Item characteristic curve A18.

Item A16 was a poor fit to the model, with a high positive residual and high adjusted Chi square of 49.908. This suggests the item under discriminates, which is confirmed by the item characteristic curve (figure 6.5.2) which shows the 10 class intervals forming a more horizontal pattern than the curve of expected scores. The item: ‘Industrial growth is necessary to maintain our economy’ may be measuring a construct other than attitude to the environment, such as beliefs about the economy.
Person Fit

Of the 2258 sample, 73 individuals were listed as having extreme scores so a residual test of fit was unavailable for them. A total of 32 individuals had a log residual test of fit statistic above 2.5 (3.2%), and 345 individuals (15.2%) had a log residual test of fit statistic below –2.5. This proportion is above the acceptable level of 5%, however, it is noted that the positive residual group (3.2%) is the one with more serious consequences for fit, hence the person fit can be considered as good. The larger negative residual group (15.2%) are considered problematic because their responses fit the Guttman pattern too perfectly (they may be answering too consistently, or according to a ‘set’), but this has less serious implications for the quality of the scale as a whole.

Distribution of scores and location of items

The Attitude 2 scale using New Environmental Paradigm items to measure general environmental attitude shows a similar person-item distribution to the attitude 1 scale.
with a proportion of the population located above the measured range of the continuum, as illustrated in figure 6.5.3 below.

**Figure 6.5.3** Person-item distribution for Attitude 2 scale.

Overall, the analysis of the general environmental attitude scale (attitude 2) showed a reasonable fit of data to the model despite one item with a poor fit. The person-item interaction is good and a person separation index of 0.766 was obtained. Table 6.5.2 shows the summary statistics for the item-person interaction.

**Table 6.5.2** Item-person interaction for general environmental attitude scale.

<table>
<thead>
<tr>
<th>ITEMS</th>
<th>PERSONS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Location</td>
</tr>
<tr>
<td>Mean</td>
<td>0.000</td>
</tr>
<tr>
<td>SD</td>
<td>0.713</td>
</tr>
<tr>
<td>Correlation</td>
<td>0.000</td>
</tr>
<tr>
<td>Complete data DF</td>
<td>= 0.877</td>
</tr>
</tbody>
</table>
6.6  Analysis of Behaviour Scale

Analysis of the 6 item general environmental behaviour scale resulted in a Chi square test of fit statistic of 935.746 with 54 degrees of freedom, and the extreme total chi square test of fit probability of 1.000 suggests that the items fit poorly. A closer examination of items for fit to the model is necessary to determine the fit of the data to the model.

**Item Fit**

Viewing the items in order of adjusted probability (table 6.6.1) it is clear that only two items fit well (B1 and B6), and one item (B5) fits particularly badly. Some of these items will be examined in more detail below.

<table>
<thead>
<tr>
<th>Item</th>
<th>Location</th>
<th>SE</th>
<th>Residual</th>
<th>DegFree</th>
<th>DatPts</th>
<th>Chi Sq</th>
<th>Prob</th>
<th>Adjusted Chi Sq</th>
<th>Adjusted Prob</th>
<th>DF</th>
</tr>
</thead>
<tbody>
<tr>
<td>B1</td>
<td>0.213</td>
<td>0.02</td>
<td>0.591</td>
<td>1844.67</td>
<td>2219</td>
<td>35.364</td>
<td>0.000</td>
<td>4.775</td>
<td>0.853</td>
<td>9</td>
</tr>
<tr>
<td>B6</td>
<td>-0.401</td>
<td>0.03</td>
<td>5.825</td>
<td>1846.33</td>
<td>2221</td>
<td>81.553</td>
<td>0.000</td>
<td>11.011</td>
<td>0.275</td>
<td>9</td>
</tr>
<tr>
<td>B3</td>
<td>0.302</td>
<td>0.03</td>
<td>-2.555</td>
<td>1843</td>
<td>2217</td>
<td>109.96</td>
<td>0.000</td>
<td>14.846</td>
<td>0.095</td>
<td>9</td>
</tr>
<tr>
<td>B4</td>
<td>-0.354</td>
<td>0.03</td>
<td>-3.509</td>
<td>1843</td>
<td>2217</td>
<td>120.96</td>
<td>0.000</td>
<td>16.332</td>
<td>0.060</td>
<td>9</td>
</tr>
<tr>
<td>B2</td>
<td>-0.508</td>
<td>0.03</td>
<td>-4.743</td>
<td>1845.5</td>
<td>2220</td>
<td>155.09</td>
<td>0.000</td>
<td>20.94</td>
<td>0.013</td>
<td>9</td>
</tr>
<tr>
<td>B5</td>
<td>0.749</td>
<td>0.02</td>
<td>12.162</td>
<td>1840.51</td>
<td>2214</td>
<td>432.81</td>
<td>1.000</td>
<td>58.435</td>
<td>0.000</td>
<td>9</td>
</tr>
</tbody>
</table>

Item B1 was the best fitting item in the scale, with low log residual and chi square test of fit statistics. As figure 6.6.1 below shows, the obtained mean scores for 10 class intervals across the whole range of person estimates, are located close to the curve of expected values. This indicates that the item: ‘At home do you separate the
garbage for recycling’ obtains a response from participants consistent with the model.

**Figure 6.6.1** Item characteristic curve for item B1 (adjusted Chi square 0.853).

In contrast, item B5 is the worst fitting item, with large positive log residual and large adjusted Chi square statistics, suggesting the item under-discriminates. The item characteristic curve (figure 6.6.2) supports this, with the ten groups or class intervals forming a more horizontal pattern than expected, so individuals tended to respond positively to this item regardless of the general trend in their other environmental behaviours. This could suggest that the item ‘At home do you travel by car when you could walk or cycle’ may not be the same as the other environmental behaviours included in the scale.
Profiles of individuals

A total of 91 individuals reported a log residual test of fit below \(-2.5\) (4%), and no individuals scored above 2.5. This total of 4% of individuals with a fit statistic outside the acceptable margin is just within the 5% considered to be allowable due to chance, hence person fit is accepted as good.

Distribution of scores and location of items

The item distribution does not adequately measure the individuals, who have a far greater variation in location than the items can measure. Figure 6.6.3 below illustrates the difference between person and item locations.
Figure 6.6.3  Person item location for general environmental behaviour scale.

Overall the analysis of the general environmental behaviour scale showed a reasonable fit of data to the model despite a few items with a poor fit. The person item interaction is good, with a person separation index of 0.668 being obtained. The summary statistics are presented in table 6.6.2 below.

Table 6.6.2  Item-person interaction for behaviour scale.

<table>
<thead>
<tr>
<th>ITEMS</th>
<th>ITEMS</th>
<th>PERSONS</th>
<th>PERSONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>0.000</td>
<td>1.295</td>
<td>0.920</td>
</tr>
<tr>
<td>SD</td>
<td>0.499</td>
<td>6.534</td>
<td>0.905</td>
</tr>
<tr>
<td>Correlation</td>
<td>0.000</td>
<td>0.117</td>
<td></td>
</tr>
</tbody>
</table>

Complete data DF = 0.831
6.7 Analysis of Efficacy Scale

Analysis of the 6 item efficacy scale resulted in a total item Chi square statistic of 297.550 with 47 degrees of freedom, but once again, the total chi square test of fit probability of 0.000 suggests not all the items are working well in this scale. A closer examination of items for fit to the model is necessary to determine the quality of the efficacy scale.

Item Fit

Viewing the items in order of adjusted probability (table 6.7.1) it is clear that the worst fitting item is E2, and the best fitting item is E6. In general however, the relatively small chi square and log residual test of fit statistics of all the items suggests this scale generally has a very good item fit. Some of these items are examined in more detail below.

**Table 6.7.1 Efficacy items in residual order.**

<table>
<thead>
<tr>
<th>Item</th>
<th>Location</th>
<th>SE</th>
<th>Residual</th>
<th>DegFree</th>
<th>DatPts</th>
<th>Chi Sq</th>
<th>Prob</th>
<th>Adjusted Chi Sq</th>
<th>Adjusted Prob</th>
<th>degF</th>
</tr>
</thead>
<tbody>
<tr>
<td>E6</td>
<td>0.053</td>
<td>0.038</td>
<td>-3.71</td>
<td>1617.52</td>
<td>1979</td>
<td>23.193</td>
<td>0.000</td>
<td>3.371</td>
<td>0.909</td>
<td>8</td>
</tr>
<tr>
<td>E4</td>
<td>0.079</td>
<td>0.035</td>
<td>-2.636</td>
<td>1634.69</td>
<td>2000</td>
<td>36.068</td>
<td>0.000</td>
<td>5.242</td>
<td>0.731</td>
<td>8</td>
</tr>
<tr>
<td>E3</td>
<td>-0.106</td>
<td>0.06</td>
<td>-2.647</td>
<td>1087.07</td>
<td>1330</td>
<td>40.857</td>
<td>0.000</td>
<td>5.938</td>
<td>0.547</td>
<td>7</td>
</tr>
<tr>
<td>E5</td>
<td>0.305</td>
<td>0.034</td>
<td>1.195</td>
<td>1671.47</td>
<td>2045</td>
<td>48.954</td>
<td>0.000</td>
<td>7.115</td>
<td>0.524</td>
<td>8</td>
</tr>
<tr>
<td>E2</td>
<td>0.748</td>
<td>0.029</td>
<td>2.783</td>
<td>1637.96</td>
<td>2004</td>
<td>71.472</td>
<td>0.000</td>
<td>10.388</td>
<td>0.239</td>
<td>8</td>
</tr>
<tr>
<td>E1</td>
<td>-1.079</td>
<td>0.045</td>
<td>-1.303</td>
<td>1663.3</td>
<td>2035</td>
<td>77.007</td>
<td>0.000</td>
<td>11.193</td>
<td>0.191</td>
<td>8</td>
</tr>
</tbody>
</table>

The best fitting item was E6, with low chi square value of 3.371, and low log residual and test of fit statistic, and an adjusted probability of 0.909. As figure 6.7.1 below shows, the obtained mean scores for 10 groups or class intervals across the whole range of person estimates, are located close to the curve of expected values.
Figure 6.7.1  Item characteristic curve for E6.

The worst fitting item is E2 with an adjusted chi square value of 11.193 and probability of 0.191. While the fit statistics for item E1 indicate it is the worst fitting item of the scale, the item characteristic curve (figure 6.7.2) shows the mean responses across the ten class intervals following the curve of expected values fairly closely, indicating the item is operating as expected.

Figure 6.7.2  Item characteristic curve for item E1.
**Person fit**

Of the 2258 sample, 192 individuals were listed as having extreme scores so a residual test of fit was unavailable for them. It is generally accepted that a fit statistic of + or -2.5 is the margin over which fit may be considered problematic. Nineteen individuals (0.84%) had a log residual test of fit statistic above 2.5, and seven individuals (0.31%) had a log residual test of fit statistic below -2.5. This proportion is well within the acceptable level of 5%.

**Person Item Distribution**

The person item distribution (figure 6.7.3) indicates that while the scale measures a range of -1 to +1 on the continuum, a large proportion of individuals are located above this range and are therefore not being measured very reliably by this scale.

**Figure 6.7.3** Person-item distribution for efficacy scale.

Overall the analysis of the efficacy scale showed a reasonable fit of data to the model despite a few items with a poor fit. The person-item interaction is good, with a
A person separation index of 0.763 being obtained. Table 6.7.2 below presents the summary statistics for person item interaction.

Table 6.7.2  Item-person interaction for efficacy scale.

<table>
<thead>
<tr>
<th>ITEMS</th>
<th>PERSONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td>Fit Residual</td>
</tr>
<tr>
<td>Mean</td>
<td>-1.053</td>
</tr>
<tr>
<td>SD</td>
<td>2.527</td>
</tr>
<tr>
<td>Correlation</td>
<td>0.000</td>
</tr>
<tr>
<td>Complete data DF</td>
<td>= 0.817</td>
</tr>
</tbody>
</table>

6.8 Summary

In summary, while the four scales combined did indicate the possibility of links between the four measured constructs (knowledge, attitude, behaviour and efficacy) the scale as a whole was not acceptably reliable, so the sub-scales of knowledge, attitude 1, attitude 2, behaviour and efficacy were used as five separate measurement scales. Of these five scales there were some with an excellent fit to the model and some that fitted the model less closely. All the scales however produced results within an acceptable level of fit and therefore can be considered valid and reliable measures of the five constructs.
Chapter 7

Baseline data: Profile of sample population and workplaces

In order to answer the main research question,

‘What is the most effective educational strategy to use in a workplace situation to induce voluntary behaviour change to more environmentally sustainable transport modes?’

it was necessary first to profile the sample population before any educational intervention was conducted, in order that any change achieved may be measured against a benchmark. This chapter describes the characteristics of the participants through the pre-intervention survey of knowledge, attitude, efficacy and behaviour, and through observation of the structure and function of participant workplaces.

Table 7.0.1 below summarises the access audit data and characteristics of the 13 organisations that participated in the ‘TravelSmart Workplace’ program.
### Table 7.0.1 Profile of the 13 volunteer workplaces.

<table>
<thead>
<tr>
<th>ID</th>
<th>Intervention</th>
<th>Type</th>
<th>#Employees</th>
<th>Env policy</th>
<th>Fleet cars</th>
<th>Showers</th>
<th>Bike locking racks</th>
<th>Tele-work policy</th>
<th>Parking spaces</th>
</tr>
</thead>
<tbody>
<tr>
<td>1*</td>
<td>A</td>
<td>engineering</td>
<td>400</td>
<td>No</td>
<td>93</td>
<td>2</td>
<td>12</td>
<td>n</td>
<td>138</td>
</tr>
<tr>
<td>2*</td>
<td>B</td>
<td>government</td>
<td>400</td>
<td>Yes</td>
<td>35</td>
<td>5</td>
<td>30</td>
<td>y</td>
<td>37</td>
</tr>
<tr>
<td>3*</td>
<td>B</td>
<td>engineering</td>
<td>300</td>
<td>Yes</td>
<td>22</td>
<td>8</td>
<td>9</td>
<td>y</td>
<td>33</td>
</tr>
<tr>
<td>4</td>
<td>A</td>
<td>other</td>
<td>100</td>
<td>No</td>
<td>?</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>40</td>
</tr>
<tr>
<td>5</td>
<td>B</td>
<td>other</td>
<td>220</td>
<td>No</td>
<td>?</td>
<td>2</td>
<td>5</td>
<td>n</td>
<td>20</td>
</tr>
<tr>
<td>6</td>
<td>B</td>
<td>other</td>
<td>120</td>
<td>No</td>
<td>n</td>
<td>2</td>
<td>n</td>
<td>n</td>
<td>25</td>
</tr>
<tr>
<td>7*</td>
<td>A</td>
<td>government</td>
<td>250</td>
<td>Yes</td>
<td>y</td>
<td>4</td>
<td>12</td>
<td>y</td>
<td>y</td>
</tr>
<tr>
<td>8</td>
<td>-</td>
<td>engineering</td>
<td>-</td>
<td>-</td>
<td>y</td>
<td>y</td>
<td>y</td>
<td>n</td>
<td>y</td>
</tr>
<tr>
<td>9*</td>
<td>C</td>
<td>engineering</td>
<td>600</td>
<td>Yes</td>
<td>25</td>
<td>2</td>
<td>y</td>
<td>y</td>
<td>47</td>
</tr>
<tr>
<td>10</td>
<td>C</td>
<td>other</td>
<td>422</td>
<td>Yes</td>
<td>24</td>
<td>6</td>
<td>12</td>
<td>n</td>
<td>50</td>
</tr>
<tr>
<td>11*</td>
<td>C</td>
<td>government</td>
<td>600</td>
<td>No</td>
<td>y</td>
<td>y</td>
<td>y</td>
<td>y</td>
<td>y</td>
</tr>
<tr>
<td>12</td>
<td>C</td>
<td>engineering</td>
<td>70</td>
<td>No</td>
<td>y</td>
<td>1</td>
<td>8</td>
<td>n</td>
<td>y</td>
</tr>
<tr>
<td>13</td>
<td>B</td>
<td>government</td>
<td>300</td>
<td>No</td>
<td>y</td>
<td>y</td>
<td>y</td>
<td>y</td>
<td>y</td>
</tr>
</tbody>
</table>

n = no, y = yes but number unavailable, and ? = unknown

Of these 13 volunteers, six workplaces were examined in detail for the purposes of this research. These 6 comprised of three government workplaces: 2(Bg), 7(Ag) and 11(Cg), each completing one of the three interventions, and three engineering type workplaces: 1(Ae), 3(Be), and 9(Ce), each completing one of the three interventions. This selection was made in order to improve comparability between types of organisations across the three interventions. Table 7.0.2 presents a summary of the workplaces being used in this research – their type, intervention and number of employees.
Table 7.0.2  Intervention sample.

<table>
<thead>
<tr>
<th>Intervention</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineering</td>
<td>Ae</td>
<td>Be</td>
<td>Ce</td>
<td>1300</td>
</tr>
<tr>
<td></td>
<td>(400)</td>
<td>(300)</td>
<td>(600)</td>
<td></td>
</tr>
<tr>
<td>Government</td>
<td>Ag</td>
<td>Bg</td>
<td>Cg</td>
<td>1250</td>
</tr>
<tr>
<td></td>
<td>(250)</td>
<td>(400)</td>
<td>(600)</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>650</td>
<td>700</td>
<td>1200</td>
<td>2550</td>
</tr>
</tbody>
</table>

The responses to the pre and post questionnaire were noticeably different between the government and engineering workplaces. The first questionnaire response rate from government workplaces was closer to 50%, while the engineering type workplaces tended to have closer to 25% response rate. Figure 7.0.1 below illustrates the number of employees per workplace, and the number of employees who responded to the survey from these workplaces both times.

Figure 7.0.1  Organisation response rate to pre and post questionnaire.
7.1 Demographics of sample population

The demographics of the sample are important in this research for a number of reasons:

1. Many demographic factors are thought to have an influence on the travel behaviour patterns of individuals;

2. Different workplaces have different demographic make-up and this may influence the effectiveness of particular strategies in that environment. The data are presented in order to describe clearly the characteristics of each workplace and the intervention groups, as differences in response to intervention strategies may be explained at a later stage by differences in demographic structure; and

3. The case study type nature of this research does not allow for control of demographic variables, therefore any differences should be taken into account when drawing conclusions in an evaluation of the program.

Some data are presented in proportional bar charts for ease of comparison amongst workplaces and intervention types, as the traditional series of pie charts would prove impractical with a large number of groups. The figures show the percentage of each demographic category in a bar for each workplace, each intervention group (type a, b and c), and the entire combined sample population. The demographic factors examined here include sex, age, job type, and geographic location by transport zone.

**Sex**

Differences in proportion of males and females may influence transport mode choice. This possibility is considered due to the responsibilities of child raising remaining primarily with women (Nicholson, 1997; VandenHeuvel, 1993, 1995), and that in
Australia on average women spend twice as many of their waking hours as men on unpaid household work including parenting duties (Australian Bureau of Statistics, 2001). As a result a higher proportion of female employees may need car based transport to meet parenting requirements. Figure 7.1.1 illustrates the proportion of male and female employees in each of the six focus workplaces.

**Figure 7.1.1** Sex distribution of workplaces.

The average sex distribution for the combined workplaces in each program was slightly more male dominated than a normal population with 60% of the participants being male. Workplace Cg was the only one with a significantly higher proportion of female employees. In general the engineering organisations had a higher proportion of male employees, with Ae, Be, and Ce comprised of 69%, 78% and 86% male employees respectively. This is consistent with the characteristics of engineering corporations, which have been traditionally male dominated. Workplace Cg is the only female dominated organisation with 60.5% female employees. This is expected in a government health organisation, which also has a large number of clerical staff (figure 7.1.3).
**Age**

The age of employees may influence likelihood of taking up a more physically active form of transport. The Australian Bureau of Statistics (2003) reports that participation in physical activity is highest for the 18 to 24 year age group (73.5%), and declines steadily with age to a rate of 33.8% for persons aged 65 years and over.

As can be seen by figure 7.1.2 below, the workplaces consisted of around 55% to 60% of employees aged 18 to 40, and 40% to 45% of employees aged between 41 and 60. Workplaces Ae, Ce and Cg each had a small proportion of employees in the 61 to 65 age bracket, and workplace Ag has a small number of employees under the age of 18. Workplace Ag also has the greatest proportion of employees in the 18 to 40 age group (63%).

**Figure 7.1.2  Age distribution across workplaces.**
**Work type**

The proportion of reported job types show a clear distinction between government and engineering organisations. Figure 7.1.3 below shows that while a large proportion (65 to 70%) of employees in engineering organisations (Ae, Be and Ce) reported their jobs as professional or managerial in nature, a similarly large proportion of employees (45 to 70%) in government workplaces (Ag, Bg and Cg) report their job as clerical or administrative.

Engineering organisations also report a greater proportion of technical or field workers. This may indicate a need for car based transport, particularly if the employee needs to transport large amounts of specialised equipment from one place to another.

**Figure 7.1.3** Distribution of reported job type in six workplaces.

Workplace Ag had the highest proportion of employees engaged in clerical work, and the smallest proportion of 'professionals'. These employees are more likely to be
office based and work standard hours allowing them to plan to use alternative transports more easily.

**Geographic location (‘Transperth’ Transport Zones)**

The distance from home to work may significantly influence a participants’ choice of transport mode. One way to group participants according to distance from work is to use the existing ‘zones’ created by the Department of Transport, Transperth division, for ticketing of public transport. The Perth area is divided into 8 circular zones (figure 7.1.4) that radiate from the centre of Perth. Each zone extends outward from Perth for approximately 10km (table 7.1.1).

<table>
<thead>
<tr>
<th>Zone</th>
<th>Distance from Perth</th>
<th>Zone</th>
<th>Distance from Perth</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0 - 10 km</td>
<td>5</td>
<td>40 - 50 km</td>
</tr>
<tr>
<td>2</td>
<td>0 - 20 km</td>
<td>6</td>
<td>50 - 60 km</td>
</tr>
<tr>
<td>3</td>
<td>20 - 30 km</td>
<td>7</td>
<td>60 - 70 km</td>
</tr>
<tr>
<td>4</td>
<td>30 - 40 km</td>
<td>8</td>
<td>70 - 80 km</td>
</tr>
</tbody>
</table>

The majority (76.9%) of the sample lived within 20 km of the Perth central business district, which places the majority of all employees within the first two transport zones in Perth. A further 14% lived within zone 3, leaving a total of 9.1% of the sample living 31km or further from Perth.
The high proportion of employees living in zones one and two is generally consistent across all workplaces, as figure 7.1.5 indicates. Generally zones 1 and 2 are the most accessible by alternative transport due to the shorter distance for cyclists or walkers, and the increased level of service by public transport (Pantell, 2002). This would suggest that the majority of these employees would face fewer barriers to alternative transport use than those in more remote areas.
7.2 Pre intervention transport behaviour

The pre intervention survey indicated that the participating workplaces already have a low use of the single occupant vehicle (SOV) for commuting compared to expected figures with a total of 38% of commute trips being made with the SOV, in either a private or company vehicle (figure 7.2.1). The largest mode used apart from the SOV was public transport, which accounted for 33% of commute trips.
As figure 7.2.2 shows, there was variation in the mode share across the sample workplaces with SOV trips ranging from 14% to 38%. Workplace Cg had the highest reported use of the SOV (40%), while workplace Be had the lowest use of the SOV with only 18%. The use of company cars was highest in workplaces Ae (11%), Ag (8%) and Bg (8%). Workplaces Be and Ce which reported the lowest use of SOV also reported the highest use of public transport, 50% and 42% respectively.

Figure 7.2.2  Transport mode share of pre-intervention sample.

When mode use is examined across transport zone (figure 7.2.3) rather than workplace it is notable that despite the favourable geographical distribution of the sample (figure 7.1.5) suggesting few external barriers to alternative transport use, the proportion of SOV use is higher in zones 1 (30.7%) and 2 (32.7%), than in zone three (22.9%) or zone 4 (25.2%). This suggests the factors influencing mode choice for a large proportion of the sample choice are likely to be internal (attitude, perceived convenience, efficacy/empowerment) rather than external (distance, lack of services, travel time).
The pre-intervention distribution of cycling across the transport zones is closer to the expected pattern with a greater proportion of trips in zone one (8%) and zone two (5.7%) being made by cycling than in zone three (0.1%). The higher rate of cycling in zone four (5.52%) may be due to the location of rail lines, with two of the four rail lines terminating in zone four (see figure 7.1.4). The high proportion of cyclists in zone eight is due to the small population (n=9) in that zone.

In contrast, the pre-intervention distribution of public transport trips does not follow the expected trend. Due to the higher frequency of services in zones 1 and 2 (Pantell, 2002) it would be logical to expect a higher proportion of the sample in those zones to be using public transport. This is not the case as figure 7.2.3 illustrates, with greater public transport ridership in zones three (41.57%) and four (45.52%) compared to the 29% and 30% of public transport trips in zones one and two respectively. Once again, the high percentage of public transport trips in zone four
may be attributed to the location of Transperth rail lines to Armadale and Joondalup, both of which terminate in zone four (figure 7.1.4).

**Reasons for mode choice**

Results presented in table 7.2.1 indicate that the main reason for choice of transport mode is convenience regardless of how many trips are made by single occupant vehicle (SOV). It is notable however, that a greater proportion (58%) of participants who use the SOV for all 10 trips do so due to convenience, while only 38% of participants who use alternative transport for all 10 trips are motivated by convenience. Cost was the next most important motivation for mode choice in the 0 to 4 SOV trips per week groups, followed by exercise. Cost and exercise were not very important in the 5-10 SOV trips per week groups. More important motivators for participants driving for 5 to 10 trips per week were length of travel time, and ‘other reasons’.

When the reasons given for mode choice are examined at workplace level (figure 7.2.4) it is clear that while convenience is of similar importance across workplaces, exercise is generally an important motivator in engineering workplaces, being the main reason for 8.5% to 16.7% of the engineering workplace employees, compared with 2.7% to 10.4% of government employees. Cost was also less likely to be a main reason for mode choice in engineering workplaces than in government workplaces.
Table 7.2.1  Main reason for choice of transport mode (%) in four SOV use groups.

<table>
<thead>
<tr>
<th>Reason for Choice</th>
<th>Number of SOV Trips per week (/10)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Exercise</td>
<td>12.7</td>
</tr>
<tr>
<td>Convenience</td>
<td>38.0</td>
</tr>
<tr>
<td>Cost</td>
<td>17.5</td>
</tr>
<tr>
<td>Environmental Concerns</td>
<td>3.3</td>
</tr>
<tr>
<td>No car available</td>
<td>4.3</td>
</tr>
<tr>
<td>Errands (lunch/after work)</td>
<td>1.2</td>
</tr>
<tr>
<td>Enjoyment</td>
<td>1.2</td>
</tr>
<tr>
<td>Comfort</td>
<td>1.2</td>
</tr>
<tr>
<td>Length of Travel Time</td>
<td>5.0</td>
</tr>
<tr>
<td>Access to Cheap parking</td>
<td>1.9</td>
</tr>
<tr>
<td>Car needed for work</td>
<td>6.5</td>
</tr>
<tr>
<td>Live close to work</td>
<td>2.2</td>
</tr>
<tr>
<td>Other</td>
<td>5.0</td>
</tr>
<tr>
<td>TOTAL</td>
<td>100</td>
</tr>
</tbody>
</table>

Figure 7.2.4  Main reason for choice of mode in 6 workplaces.
7.3  Stages of change

Survey results showed that 85% of the sample had contemplated changing modes in the last 6 months. In general, a high proportion of the sample in each workplace had contemplated changing transport modes (figure 7.3.1). The workplace with the lowest proportion of contemplators was Ag (65%).

**Figure 7.3.1** Percentage of sample contemplating mode change.

![Figure 7.3.1](image)

Furthermore, a total of 49% of the sample had actually switched modes in the last 6 months. Figure 7.3.2 shows that the proportion of individuals who had actually changed their transport mode in the last 6 months was highest in the two government workplaces Cg and Ag.

**Figure 7.3.2** Percentage of sample that changed mode recently.

![Figure 7.3.2](image)
7.4 Person factors

Results of the pre intervention questionnaire show that there were differences in the mean location of some of the measured psychological constructs. These measurements are compared in table 7.4.1. The locations for knowledge ranged from 0.067 logits in workplace Be through to 0.379 logits in workplace Ae. Attitudes to car use and air quality ranged from 1.54 logits in workplace Ae through to 1.96 logits in workplace Bg. General environmental attitude location ranged from 0.899 logits in Ae through to 1.409 logits in Ce. Efficacy ranged from 1.409 logits in workplace Be through to 1.549 logits in workplace Ce. General environmental behaviour ranged from 1.06 logits in Cg through to 1.34 logits in Bg.

Table 7.4.1 Mean location (logits) of psychological constructs in six workplaces.

<table>
<thead>
<tr>
<th></th>
<th>Ae</th>
<th>Ag</th>
<th>Be</th>
<th>Bg</th>
<th>Ce</th>
<th>Cg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean knowledge</td>
<td>0.38</td>
<td>0.08</td>
<td>0.07</td>
<td>0.35</td>
<td>0.28</td>
<td>0.21</td>
</tr>
<tr>
<td>Mean attitude 1</td>
<td>1.54</td>
<td>1.90</td>
<td>1.87</td>
<td>1.97</td>
<td>1.81</td>
<td>1.95</td>
</tr>
<tr>
<td>Mean attitude 2</td>
<td>0.89</td>
<td>1.25</td>
<td>1.08</td>
<td>1.30</td>
<td>1.41</td>
<td>1.03</td>
</tr>
<tr>
<td>Mean behaviour</td>
<td>1.25</td>
<td>1.25</td>
<td>1.28</td>
<td>1.34</td>
<td>1.10</td>
<td>1.06</td>
</tr>
<tr>
<td>Mean efficacy</td>
<td>1.49</td>
<td>1.43</td>
<td>1.41</td>
<td>1.47</td>
<td>1.55</td>
<td>1.46</td>
</tr>
</tbody>
</table>
Results Chapters

The next part of the thesis presents the results of the research as relating to the research questions. In order to address the research questions and their parts the results are presented in three chapters: chapter 8 - examination of psychological factors; chapter 9 - organisational change, and; chapter 10 - motivations and barriers to transport behaviour change.

Chapter 8 presents results addressing question 1.1 (Which educational strategy has the greatest impact on participants? In what ways do different educational interventions influence employees?), which includes questions 1.1.1 through to 1.1.4, and question 2.1 (Is there a difference in the knowledge, attitude, empowerment or behaviour of participants from different types of workplaces?), and question 1.2.2 (Which intervention is perceived most positively by participants?). In order to present the results relating to these questions the chapter is broken into nine sub-sections. The first six sections (8.1 to 8.6) each examine one of the six dependent psychological variables (knowledge, attitude 1, attitude 2, efficacy, SOV trip behaviour and environmental behaviour) using analysis of variance to test for main effects, interactions and between subjects effects with the independent and experimental variables of intervention type, workplace type, workplace, sex, age, job type and transport zone. Section 8.7 examines the SOV trip behaviour in terms of the type of change made by participants (increased trips, decreased trips or no change). The eighth section (8.8) utilises interview and survey responses to examine the participant perception of the interventions to determine if there was a difference
in perception of program success and effectiveness between the intervention groups. The final section (8.9) presents participant feedback on the usefulness of the educational tools incorporated into a small evaluation of the three interventions.

Chapter 9 presents results pertaining to question 1.2.1 (*Does greater involvement lead to more significant, long-term organisational change?*), and question 2.2 (*What characteristics of a workplace influence the effectiveness of a particular educational strategy?*). In order to examine the results pertaining to these questions the chapter will examine observations of organisational change in the three intervention groups, along with interview data and documentation in order to discover any trends or patterns in organisational response to intervention types. Robbins *et al.* (1994) list of organisational culture characteristics is revisited in section 9.1 and used to compare organisational response to interventions to determine any pattern in workplace characteristics and the impact of organisational culture on the level of effectiveness of educational strategies. Section 9.2 presents summaries of the workplace case notes, and section 9.3 summarises the main organisational outcomes observed in the three intervention groups.

Chapter 10 presents results pertaining to question 1.2.3 (*What factors influence transport behaviour in a workplace?*), question 1.2.4 (*Why does a change in transport behaviour occur or not occur in a workplace?*), and question 2.3 (*What workplace characteristics affect employee behavioural change?*). This chapter utilises a range of qualitative data to determine which workplace factors provided major barriers or encouragement to alternative transport use, and an explanation for the pattern in the target behaviour change (reduction in SOV trips) is sought.
Chapter 8
Examination of Psychological factors

8.1 Knowledge Location

Examination of the mean knowledge location for the entire sample population at time 1 and time 2 indicates that knowledge increased significantly (p<0.001) over the intervention period, as illustrated in figure 8.1.1 below.

Figure 8.1.1 Knowledge location (logits) time 1 and time 2. t(489) = -5.846; p<0.001.

Mixed factorial analysis of variance indicated main effects for all independent variables except age and transport zone. Interactions were present for knowledge location x intervention type, as well as knowledge location x workplace. Only one independent variable, sex, reported a significant between subject effect. Table 8.1.1 presents a summary of results from the mixed design multiple factor analysis of
variance (ANOVA), insignificant relationships are left blank. The significant results will be examined in more detail below.

Table 8.1.1  Summary of significant ANOVA findings for knowledge location (logits) against independent variables.

<table>
<thead>
<tr>
<th>Independent variable</th>
<th>Main effect</th>
<th>Interaction</th>
<th>Between subjects effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intervention</td>
<td>F(1,487)=39.608; p&lt;0.001</td>
<td>F(2,487)=4.819; p&lt;0.005</td>
<td></td>
</tr>
<tr>
<td>Workplace (WP) type</td>
<td>F(1,487)=28.414; p&lt;0.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Workplace</td>
<td>F(1,487)=37.135; p&lt;0.001</td>
<td>F(1,487)=37.135; p&lt;0.01</td>
<td></td>
</tr>
<tr>
<td>Sex</td>
<td>F(1,479)=31.179; p&lt;0.001</td>
<td></td>
<td>F(1,479)=4.537; p&lt;0.05</td>
</tr>
<tr>
<td>Job type</td>
<td>F(1,487)=17.945; p&lt;0.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transport zone</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intervention x WP type</td>
<td>F(1,487)=37.135; p&lt;0.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sex x WP type</td>
<td>F(1,477)=18.51; p&lt;0.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sex x Intervention</td>
<td>F(1,475)=30.853; p&lt;0.001</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Knowledge x Intervention Type

The mean knowledge location of participants increased in each of the three intervention groups with the greatest increase in the intervention B group. Figure 8.1.2 illustrates the change in location for each intervention group by comparison of pre and post intervention mean knowledge location. The significant interaction between knowledge location and intervention type reported in table 8.1.1 is due to the type B intervention group having the lowest knowledge location at time 1 but the highest at time 2 as reported in table 8.1.2, rather than any decrease or anomalous result.
Figure 8.1.2  Knowledge location (logits) of intervention groups over time.

Paired sample t-tests indicate the increase in knowledge location is significant in all three intervention groups, as reported in table 8.1.2.

<table>
<thead>
<tr>
<th>Type</th>
<th>k_Locn</th>
<th>k_Locn_t2</th>
<th>change</th>
<th>Paired sample t-test</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>0.230</td>
<td>0.482</td>
<td>0.252</td>
<td>t(146)= -2.28; p&lt;0.05</td>
</tr>
<tr>
<td>B</td>
<td>0.210</td>
<td>1.048</td>
<td>0.838</td>
<td>t(112)= -4.71; p&lt;0.001</td>
</tr>
<tr>
<td>C</td>
<td>0.245</td>
<td>0.532</td>
<td>0.287</td>
<td>t(229)= -3.18; p&lt;0.005</td>
</tr>
</tbody>
</table>

Table 8.1.2  Mean knowledge location (logits) time 1 and time 2.

The ANOVA test of between-subjects effects indicates that overall there is no significant difference in the performance between the three intervention groups, F(2,487)=2.73; p>0.05, therefore it can be reported that the knowledge location was significantly increased in all three intervention groups, and that increased involvement does not lead to greater knowledge (Research Question 1.1.1).
**Knowledge and Workplace**

The interaction between knowledge location and workplace reported in table 8.1.1 is due to workplace Be reporting the lowest knowledge at time 1, and increasing the most to report the highest mean knowledge location of the six workplaces at time 2 (figure 8.1.3).

**Figure 8.1.3** Interaction of knowledge and workplace.  F(1,484) = 37.135; p<0.01.

![Graph showing interaction of knowledge and workplace](image)

As figure 8.1.3 illustrates, the level of pre intervention knowledge, as well as change in knowledge, varied greatly between workplaces, with workplace Be achieving the greatest increase, and workplace Ae actually recording a slight decrease. Paired sample t-tests showed that workplace Ae and workplace Ce did not achieve a statistically significant increase in knowledge, while all other workplaces did (table 8.1.3). Thus, different workplaces may respond differently to the interventions.
Table 8.1.3  Mean knowledge location (logits) and t-test results.

<table>
<thead>
<tr>
<th>Workplace</th>
<th>k_Locn</th>
<th>k_Locn_t2</th>
<th>change</th>
<th>Paired samples t-test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ae</td>
<td>0.379</td>
<td>0.367</td>
<td>-0.012</td>
<td>t(73)= 0.080; p&gt;0.05</td>
</tr>
<tr>
<td>Ag</td>
<td>0.080</td>
<td>0.597</td>
<td>0.517</td>
<td>t(72)= -3.407; p&lt; 0.005</td>
</tr>
<tr>
<td>Be</td>
<td>0.067</td>
<td>1.047</td>
<td>0.980</td>
<td>t(41)= -4.413; p&lt;0.001</td>
</tr>
<tr>
<td>Bg</td>
<td>0.352</td>
<td>1.049</td>
<td>0.696</td>
<td>t(70)= -2.936; p&lt; 0.005</td>
</tr>
<tr>
<td>Ce</td>
<td>0.284</td>
<td>0.491</td>
<td>0.207</td>
<td>t(65)= -1.057; p&gt;0.05</td>
</tr>
<tr>
<td>Cg</td>
<td>0.207</td>
<td>0.573</td>
<td>0.366</td>
<td>t(163)= -3.122; p&lt;0.005</td>
</tr>
</tbody>
</table>

The between subjects effect shows that there is no significant difference between the workplaces, which have a more similar time 1 knowledge location than the greater range of time 2 knowledge locations.

Closer examination of the workplaces suggests that government workplaces are more likely to increase knowledge as a result of educational intervention, as all three government workplaces achieved a significant increase in knowledge, while only one of three engineering organisations achieved such an increase (table 8.1.3).

When the workplaces are grouped and compared as government and engineering type the mean change in knowledge location for government workplaces is greater than for engineering workplaces, but the change in both groups is significant (table 8.1.4).

Table 8.1.4  Workplace type mean knowledge location (logits), time 1 and 2, and paired sample t-test results.

<table>
<thead>
<tr>
<th></th>
<th>Time 1</th>
<th>Time 2</th>
<th>change</th>
<th>Paired samples t-test</th>
</tr>
</thead>
<tbody>
<tr>
<td>G</td>
<td>0.213</td>
<td>0.740</td>
<td>0.526</td>
<td>t(301) = -5.284; p&lt;0.001</td>
</tr>
<tr>
<td>E</td>
<td>0.243</td>
<td>0.635</td>
<td>0.392</td>
<td>t(181) = -2.675; p&lt;0.01</td>
</tr>
</tbody>
</table>

The ANOVA test for within-subjects effects indicated a significant main effect for knowledge location x workplace type (F(1,488)=28.414; p<0.001), with no
interaction and no between-subjects effect. Therefore it can be concluded that while there is a difference in the increase in knowledge of participants from different workplaces, different types of workplaces do not respond differently to the interventions (*Research Question 2.1*).

**Knowledge, Intervention and Workplace type**

A main effect was reported for the 3 factor ANOVA of knowledge location x workplace type x intervention. Initial examination of the plot of marginal means for this suggested a difference in response between engineering and government workplaces for the type B intervention group. When this difference was examined with independent t-test it was found that the difference between the type B government and engineering workplace is not significant (p>0.05).

**Figure 8.1.4**  Mean knowledge location of intervention and workplace type.
**Knowledge and Sex**

Sex was the only independent variable that had a significant between subjects effect on knowledge location, with females achieving a significantly lower location than males both before and after the intervention period, as illustrated in figure 8.1.5. This indicates that males and females were statistically distinct groups before treatment with regard to knowledge location.

**Figure 8.1.5** Between Subjects effect of sex on knowledge. \( F(1,479) = 4.537; \ p<0.05 \)

The presence of a main effect without any interaction shows that the knowledge of both males and females is increased in the same way, and these increases are significant as reported in table 8.1.5.

**Table 8.1.5** Mean knowledge locations and paired sample t-test results for sex.

<table>
<thead>
<tr>
<th></th>
<th>Time 1</th>
<th>Time 2</th>
<th>change</th>
<th>Paired samples t-test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Males</td>
<td>0.233</td>
<td>0.644</td>
<td>0.411</td>
<td>(t(489) = -5.846; \ p&lt;0.001)</td>
</tr>
<tr>
<td>Females</td>
<td>0.081</td>
<td>0.536</td>
<td>0.455</td>
<td>(t(193) = -4.097; \ p&lt;0.001)</td>
</tr>
</tbody>
</table>
Knowledge, Sex & Workplace type, and Knowledge, Sex & Intervention

The trend of lower female knowledge location is consistent across workplace type, with females located significantly below males in both government and engineering workplaces. Interestingly the gap between male and female knowledge location is greater in government workplaces than engineering workplaces as illustrated in figure 8.1.6 below.

Figure 8.1.6 Knowledge location (logits), workplace type and sex.

When the mean male and female knowledge location is compared across interventions (figure 8.1.7) it appears that the trend of lower female knowledge location is no longer valid, with higher female mean knowledge location in the type B intervention.
Interestingly, independent samples t-tests report that the difference between male and female knowledge location in the type A intervention is not significant (p>0.05), while the apparently similar difference between male and female knowledge location in the type C intervention is significant, t(219) = 2.026; p<0.05. However, the ANOVA does not report this as a significant interaction, F(2,475) = 1.546; p>0.05.
8.2 Attitude 1 – Air quality and car use

Examination of the mean attitude 1 location for the entire sample population at time 1 and time 2 indicates a significant (p<0.005) increase in positive attitudes pertaining to air quality and car use over the intervention period, as illustrated by figure 8.2.1.

Figure 8.2.1 Attitude 1 location (logits) over time. t(475)= -2.878; p<0.005

Mixed factorial analysis of variance indicated main effects for all independent variables except age and transport zone. Only one interaction was reported, between attitude 1 and workplace type, and three independent variables reported between subjects effects (Intervention type, workplace, and job type). The results of the mixed design multiple factor ANOVA are presented in table 8.2.1. The significant results will be examined in more detail.
Table 8.2.1  Summary of significant ANOVA findings for attitude 1 location (logits) against independent variables.

<table>
<thead>
<tr>
<th>Independent variable</th>
<th>Main effect</th>
<th>Interaction</th>
<th>Between subjects effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intervention type</td>
<td>F(1,473)=8.721; p&lt;0.005</td>
<td>F(2,473)=3.984; p&lt;0.05</td>
<td></td>
</tr>
<tr>
<td>WP type</td>
<td>F(1,474)=5.240; p&lt;0.05</td>
<td>F(1,474)=4.005; p&lt;0.05</td>
<td></td>
</tr>
<tr>
<td>WP</td>
<td>F(1,470)=6.147; p&lt;0.05</td>
<td>F(5,470)=2.544; p&lt;0.05</td>
<td></td>
</tr>
<tr>
<td>Sex</td>
<td>F(1,465)=10.27; p&lt;0.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Job type</td>
<td>F(1,473)=6.033; p&lt;0.05</td>
<td>F(4,471)=3.628; p&lt;0.01</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transport zone</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intervention type x WP type</td>
<td>F(1,470)=6.147; p&lt;0.05</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sex x WP type</td>
<td>F(1,463)=6.051; p&lt;0.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sex x Intervention type</td>
<td>F(1,461)=10.38; p&lt;0.001</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Attitude 1 and Intervention**

The mean attitude 1 location (attitude to air quality and car use) increased in two of the three intervention groups as figure 8.2.2 illustrates. Intervention B increased most, while intervention A actually decreased slightly (table 8.2.2). Paired sample t-test showed the increase in both intervention B and C to be significant, while no significant difference in location was reported for the type A intervention (table 8.2.2).

Interestingly, the significant between subjects effect (F(2,473)=3.984; p<0.05) indicates the type C intervention group is a statistically distinct group with significantly higher pre-intervention attitude 1 compared with the type A and type B intervention groups. Despite the more positive pre intervention attitudes to air
quality and car use, a significant increase was still achieved by the type C intervention group.

Figure 8.2.2  Pre and post intervention attitude 1 location (logits) across interventions.

![Graph showing pre and post intervention attitude 1 location (logits) across interventions.]

Table 8.2.2  Mean attitude 1 locations (logits) and paired sample t-test results.

<table>
<thead>
<tr>
<th>Type</th>
<th>A1_locn</th>
<th>A1_locn_t2</th>
<th>Change</th>
<th>Paired sample t-test results</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1.6305</td>
<td>1.6155</td>
<td>-0.015</td>
<td>t(142)= -0.22; p&gt;0.05</td>
</tr>
<tr>
<td>B</td>
<td>1.691</td>
<td>2.0935</td>
<td>0.4025</td>
<td>t(109)= -2.21; p&lt;0.05</td>
</tr>
<tr>
<td>C</td>
<td>2.0225</td>
<td>2.221</td>
<td>0.1985</td>
<td>t(222)= -2.31; p&lt;0.05</td>
</tr>
</tbody>
</table>

These results indicate that the information intervention (A) is not successful in influencing the target attitudes toward car use and air quality issues, while the other two interventions significantly increase positive attitudes to car use and air quality. Therefore, greater involvement does lead to the development of more positive attitudes toward air quality and car use issues (Research Question 1.1.2).
**Attitude 1 and Workplace**

Initial examination of the workplaces suggests that more positive attitudes to car use and air quality developed in all workplaces except Ae, as figure 8.2.3 illustrates.

**Figure 8.2.3** Mean attitude 1 (logits) of workplaces over time.

Closer examination using paired sample t-tests reveals that the changes in workplace Bg and Cg are significant while the smaller changes in the other four workplaces are not significant (table 8.2.3).

**Table 8.2.3** Mean attitude 1 location (logits), time 1 and time 2.

<table>
<thead>
<tr>
<th>Workplace</th>
<th>T1</th>
<th>T2</th>
<th>change</th>
<th>Paired samples t-test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ae</td>
<td>1.462</td>
<td>1.364</td>
<td>-0.098</td>
<td>t(72)=0.95; p&gt;0.05</td>
</tr>
<tr>
<td>Ag</td>
<td>1.799</td>
<td>1.867</td>
<td>0.068</td>
<td>t(69)=-0.87; p&gt;0.05</td>
</tr>
<tr>
<td>Be</td>
<td>1.878</td>
<td>2.107</td>
<td>0.229</td>
<td>t(41)=-0.941; p&gt;0.05</td>
</tr>
<tr>
<td>Bg</td>
<td>1.504</td>
<td>2.08</td>
<td>0.576</td>
<td>t(67)=-2.004; p&lt;0.05</td>
</tr>
<tr>
<td>Ce</td>
<td>2.225</td>
<td>2.332</td>
<td>0.107</td>
<td>t(62)=-0.309; p&gt;0.05</td>
</tr>
<tr>
<td>Cg</td>
<td>1.82</td>
<td>2.11</td>
<td>0.290</td>
<td>t(159)=-2.455; p&lt;0.01</td>
</tr>
</tbody>
</table>
Workplace (identity) was reported as having a significant between subjects effect on attitude 1 location (table 8.2.1). Comparison of the mean knowledge locations of each workplace indicate that workplace Ce has a significantly ($p<0.05$) higher pre intervention mean attitude 1 than any of the other workplaces which were grouped more closely together. Workplace Ce also maintained the highest mean attitude 1 location post intervention. These results suggest workplace Ce is a different group to the other five workplaces, and may be the reason for a lack of change in attitude 1 over the intervention period in this workplace.

From these results it can be concluded that individual workplaces can have different attitudes to air quality and car use, and may respond differently to educational interventions (Research Question 2.1)

When the workplaces are grouped as government or engineering types it appears that government workplace attitudes to car use and air quality are increased more than those of engineering workplaces (figure 8.2.4). The ANOVA between subjects effects test reports no significant difference between the performance of the engineering and government workplace type groups, indicating that overall the groups start as comparable populations. The significant interaction reported in table 8.2.1 indicates the two groups were affected differently over the intervention period.
Figure 8.2.4 Interaction: attitude 1 and workplace type. \( F(1,474) = 4.005; p<0.05 \)

Paired sample t-tests report that the difference in attitude 1 is significant in the government sample, but not significant in the engineering sample (table 8.2.4).

Table 8.2.4 Mean attitude 1 locations and paired sample t-test results.

<table>
<thead>
<tr>
<th></th>
<th>Time 1</th>
<th>Time 2</th>
<th>change</th>
<th>Paired sample t-test results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineering</td>
<td>1.855</td>
<td>1.934</td>
<td>0.079</td>
<td>( t(177) = -0.226; p&gt;0.05 )</td>
</tr>
<tr>
<td>Government</td>
<td>1.708</td>
<td>2.019</td>
<td>0.311</td>
<td>( t(297) = -3.19; p&lt;0.005 )</td>
</tr>
</tbody>
</table>

It can therefore be concluded that there is a difference in the attitude 1 of participants from different types of workplaces (Research Question 2.1).

**Attitude 1 and Job type**

The independent variable of job type had a significant between subjects effect (table 8.2.1). As figure 8.2.6 illustrates, the managerial/professional group reported significantly lower attitudes than the other two groups on both occasions (time 1:
F(2,483)=3.050; p<0.05, time 2: F(2,480)=5.040; p<0.01). The only group to achieve a significant increase in attitude 1 over the intervention period was clerical/administrative, t(191)= 2.547; p<0.05.

Figure 8.2.5  Between subjects effect: Attitude 1 and job type. F(4,471)=3.628

<table>
<thead>
<tr>
<th>Time</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Attitude 1 Location</td>
<td>1.4</td>
<td>2.6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Job Type</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clerical/Admin</td>
<td>1.6</td>
<td>2.2</td>
</tr>
<tr>
<td>Technical/field</td>
<td>1.8</td>
<td>2.4</td>
</tr>
<tr>
<td>Manager/Professional</td>
<td>2.0</td>
<td>2.6</td>
</tr>
</tbody>
</table>

Attitude 1 and Sex

The independent variable of sex, which reported a main effect (F(1,465)=10.27; p<0.001) did not report a significant between subjects effect. In contrast with the mean knowledge location for sex (figure 8.1.4) where the male sample reported higher mean knowledge than the female sample, for attitude 1 the observation is reversed (figure 8.2.6), with mean female attitude 1 higher than mean male attitude 1. Interestingly, while there is no significant difference between the male and female mean attitude 1 at time 1, the difference at time 2 is significant, t(400.2) = -3.030;
p<0.005. Both male and female attitude 1 was significantly increased over the intervention period (table 8.2.5).

**Figure 8.2.6** Mean attitude 1 location (logits) for sex, time 1 and 2.

![Graph showing mean attitude location for male and female over time](image)

**Table 8.2.5** Male and female attitude 1 locations and paired sample t-test results.

<table>
<thead>
<tr>
<th></th>
<th>Time 1</th>
<th>Time 2</th>
<th>Change</th>
<th>Paired sample t-test results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Females</td>
<td>1.853</td>
<td>2.155</td>
<td>0.302</td>
<td>t(189) = -2.502; p&lt;0.05</td>
</tr>
<tr>
<td>Males</td>
<td>1.781</td>
<td>1.991</td>
<td>0.210</td>
<td>t(475) = -2.878; p&lt;0.005</td>
</tr>
</tbody>
</table>
8.3 Attitude 2 – General Environmental Attitudes

Examination of the mean attitude 2 location of the entire sample at time 1 and time 2 shows a small increase, as illustrated in figure 8.3.1. Paired sample t-test indicates the difference is not significant ($t(472) = -0.950; p>0.05$).

**Figure 8.3.1**  Mean general environmental attitude location (logits) time 1 and 2.

Mixed design multiple factor analysis of variance tests of general environmental attitudes against the independent variables indicated no main effects and no interactions were present. Two between subjects effects were reported, for the variables sex ($F(1,462)=14.980; p<0.001$) and job type ($F(2,470)=5.844; p<0.005$).

The between subjects effect of sex is clearly illustrated in figure 8.3.2, and indicates that females have more positive environmental attitudes than males on both occasions (pre and post intervention). There is no significant change in the attitude
location of males or females over the intervention period, which was expected as
genral environmental attitudes were not targeted during the educational
interventions.

**Figure 8.3.2**  Attitude 2 locations for sex. $F(1,462)=14.980; p<0.001$.

![Attitude 2 locations for sex.](image)

The between subjects effect of job type for attitude 2 (figure 8.3.3 below) was very
similar to that observed for attitude 1 (figure 8.2.5). As for attitude 1, the group of
participants working in managerial or professional roles had significantly lower (less
positive) general environmental attitudes on both occasions (time 1: $F(2,480)=5.137;
p<0.01$, time 2: $F(2,480)=4.317; p<0.05$).
These findings indicate that while job type and sex have a significant influence on general environmental attitudes, different workplaces have similar general environmental attitudes, and intervention type does not influence these attitudes.
8.4 Efficacy

Efficacy location appeared to increase over the intervention period, as illustrated in figure 8.4.1 below. The difference is not significant however, as a paired samples t test shows, t(481) = -1.733; p=0.084.

Figure 8.4.1 Efficacy location (logits) time 1 and 2 error bar.

The mixed design multiple factor analysis of variance of the efficacy location variable indicated a main effect over time in some of the independent variables, but no interactions or between subjects effects were reported suggesting that the pre-intervention levels of efficacy are the same across the various independent variable groups. Table 8.4.1 summarises these findings.
Table 8.4.1  Summary of significant ANOVA findings for efficacy location against independent variables.

<table>
<thead>
<tr>
<th>Independent variable</th>
<th>Main effect</th>
<th>Interaction</th>
<th>Between subjects effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intervention type</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WP type</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WP</td>
<td>F(1,476)=3.984; p&lt;0.05</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sex</td>
<td>F(1,471)=3.898; p&lt;0.05</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Job type</td>
<td>F(1,479)=4.722; p&lt;0.05</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TPZ</td>
<td>F(1,467)=5.499; p&lt;0.05</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intervention type x WP type</td>
<td>F(1,476)=3.984; p&lt;0.05</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sex x WP type</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sex x Intervention type</td>
<td>F(1,467)=4.992; p&lt;0.05</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Efficacy and Intervention type

Analysis of variance test for within-subjects effects showed that there was no significant main effect of efficacy location, and the ANOVA test for between-subjects effects indicated there was no difference in the performance of the three intervention groups. Therefore it can be reported that increased involvement does not increase sense of empowerment. Figure 8.4.2 illustrates the similar non-significant (table 8.4.2) increases in efficacy across the three intervention groups.

Table 8.4.2  Mean efficacy location, time 1 and time 2.

<table>
<thead>
<tr>
<th>Intervention</th>
<th>e_locn_t1</th>
<th>e_locn_t2</th>
<th>Change</th>
<th>Paired sample t-test results</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1.462</td>
<td>1.540</td>
<td>0.078</td>
<td>t(143) = -0.758; p&gt;0.05</td>
</tr>
<tr>
<td>B</td>
<td>1.441</td>
<td>1.628</td>
<td>0.187</td>
<td>t(112) = -1.062; p&gt;0.05</td>
</tr>
<tr>
<td>C</td>
<td>1.503</td>
<td>1.678</td>
<td>0.175</td>
<td>t(224) = -1.144; p&gt;0.05</td>
</tr>
</tbody>
</table>
Figure 8.4.2  Mean efficacy location time 1 and time 2 for three intervention groups.

![Graph showing efficacy location for three intervention groups with time points and sample sizes.]

Efficacy location and Workplace

Most workplaces increased their efficacy location, the exceptions being Ae and Ce, as illustrated in figure 8.4.3. Paired sample t-tests indicate that the change in efficacy in each of the workplaces is not significant (table 8.4.3).

Figure 8.4.3  Pre and post intervention efficacy location across workplaces.

![Graph showing efficacy location changes over time for different workplaces.]
Table 8.4.3  Workplace efficacy locations and paired sample t-test results.

<table>
<thead>
<tr>
<th>WP</th>
<th>e_locn_t1</th>
<th>e_locn_t2</th>
<th>Change</th>
<th>Paired samples t-test results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ae</td>
<td>1.497</td>
<td>1.463</td>
<td>-0.034</td>
<td>t(71) = 0.403; p&gt;0.05</td>
</tr>
<tr>
<td>Bg</td>
<td>1.474</td>
<td>1.690</td>
<td>0.216</td>
<td>t(70) = 0.810; p&gt;0.05</td>
</tr>
<tr>
<td>Be</td>
<td>1.409</td>
<td>1.566</td>
<td>0.157</td>
<td>t(41) = -0.780; p&gt;0.05</td>
</tr>
<tr>
<td>Ag</td>
<td>1.427</td>
<td>1.617</td>
<td>0.190</td>
<td>t(71) = -1.664; p&gt;0.05</td>
</tr>
<tr>
<td>Ce</td>
<td>1.549</td>
<td>1.887</td>
<td>0.338</td>
<td>t(62) = -1.687; p&gt;0.05</td>
</tr>
<tr>
<td>Cg</td>
<td>1.457</td>
<td>1.469</td>
<td>0.012</td>
<td>t(161) = 0.121; p&gt;0.05</td>
</tr>
</tbody>
</table>

When the workplaces are grouped as engineering and government it appears the mean change in efficacy location is greater for engineering type workplaces (table 8.4.4), however this increase is not significant (p>0.05). Analysis of variance for within-subjects effects does not report any significant main effect, or any significant between-subjects effect, suggesting that type of workplace does not influence efficacy location.

Table 8.4.4  Efficacy locations and paired sample t-tests for workplace type.

<table>
<thead>
<tr>
<th></th>
<th>Time 1</th>
<th>Time 2</th>
<th>Change</th>
<th>Paired sample t-test results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineering</td>
<td>1.485</td>
<td>1.638</td>
<td>0.153</td>
<td></td>
</tr>
<tr>
<td>Government</td>
<td>1.453</td>
<td>1.592</td>
<td>0.139</td>
<td></td>
</tr>
</tbody>
</table>

Efficacy location and Sex

Analysis of variance shows a main effect of sex on efficacy location (table 8.4.1). Initial examination of the mean efficacy location for males and females suggests that there is an increase in level of efficacy (figure 8.4.4). However, paired sample t-tests report no significant difference in either the male or female sample over the intervention period (p>0.05).
**Figure 8.4.4** Mean efficacy locations for males and females over time.

![Graph showing mean efficacy locations for males and females over time.](image_url)

**Efficacy and job type**

Analysis of variance also shows a main effect of job type on efficacy location (table 8.4.1). However, once again paired sample t-tests indicate that the differences between the pre and post intervention efficacy location for each group are not significant (p>0.05).

**Figure 8.4.5** Mean efficacy locations for job type.

![Graph showing mean efficacy locations for job type.](image_url)
**Efficacy location and Transport zone**

Analysis of variance shows a main effect of transport zone on efficacy location (table 8.4.1). Examination of the pre and post intervention mean efficacy location for each transport zone suggested there was little change in most transport zones groups, but there was change in the zone 5, 7 and 8 groups. A paired sample t-test of these three groups showed a significant increase in efficacy location \((t(10)=-2.931; p<0.05)\), however there is a very small sample of participants even with the three zones grouped as one \((n=11)\).

**Figure 8.4.6** Mean pre and post intervention efficacy locations for transport zones.
8.5 General Environmental Behaviour

Examination of the mean environmental behaviour location at time 1 and time 2 reveals an unexpected result; the location is decreased, as illustrated in figure 8.5.1. Paired samples t-test indicated the difference is significant, $t(487) = 15.342; p<0.001$. 

Figure 8.5.1 General environmental behaviour location, time 1 and time 2.

The analysis of variance indicated a main effect on general behaviour for all the independent variables. One interaction between behaviour and intervention type was present, and the two variables age and transport zone had significant between subjects effects. Table 8.5.1 presents a summary of the results of mixed design multiple factor analysis of variance (ANOVA).
Table 8.5.1  Summary of significant ANOVA findings for general environmental behaviour location against independent variables.

<table>
<thead>
<tr>
<th>Independent variable</th>
<th>Main effect</th>
<th>Interaction</th>
<th>Between subjects effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intervention type</td>
<td>F(1,485)=247.880; p&lt;0.001</td>
<td>F(2,485)=5.371; p&lt;0.005</td>
<td></td>
</tr>
<tr>
<td>WP type</td>
<td>F(1,486)=223.002; p&lt;0.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WP</td>
<td>F(1,482)=225.883; p&lt;0.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sex</td>
<td>F(1,477)=239.330; p&lt;0.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Job type</td>
<td>F(1,485)=149.252; p&lt;0.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>F(1,481)=10.978; p&lt;0.001</td>
<td>F(3,481)=2.959; p&lt;0.05</td>
<td></td>
</tr>
<tr>
<td>TPZ</td>
<td>F(1,473)=13.923; p&lt;0.001</td>
<td>F(7,473)=2.095; p&lt;0.05</td>
<td></td>
</tr>
<tr>
<td>Intervention type x WP type</td>
<td>F(1,475)=199.720; p&lt;0.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sex x WP type</td>
<td>F(1,473)=249.820; p&lt;0.05</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Environmental behaviour and intervention*

Analysis of variance shows a main effect of intervention on environmental behaviour location. General environmental behaviour as reported in the survey decreased over the intervention period in all three groups (figure 8.5.2). Paired sample t-tests indicate the change in all three groups is significant (p<0.001). The significant interaction reported in table 8.5.1 is explained by the intervention C group which had the lowest time 1 behaviour location but the highest time 2 behaviour location.
**Environmental Behaviour and Age**

A significant between subjects effect was reported for the age groups (table 8.5.1). Examination of the environmental behaviour locations of the four age categories (figure 8.5.3) indicates that the 41 to 60 age group has a higher environmental behaviour location pre and post intervention compared to the other age groups (p<0.05).

**Figure 8.5.3** Environmental behaviour locations of age groups.
**Environmental Behaviour and Transport zone**

Similarly, the analysis of variance reported a significant between subjects effect for transport zone (table 8.5.1). Examination of the environmental behaviour locations of the different transport zone groups (figure 8.5.4) indicates some of the zone groups have significantly higher pre-intervention locations than others (p<0.05).

**Figure 8.5.4**  Environmental behaviour locations of transport zone groups.

Overall the data suggests there is a negative effect on general environmental behaviours over the intervention period in all independent variable groupings. In addition there appears to be a difference in reported environmental behaviours from age groups, and transport zones.
8.6 SOV trips

Examination of the mean number of weekly SOV trips indicates a decrease over the intervention period for the sample as a whole, as illustrated in figure 8.6.1. This decrease was confirmed as significant by paired samples t-test, $t(489) = 2.519$; $p<0.05$.

Figure 8.6.1  SOV trips time 1 and 2 error bar.

Mixed factor analysis of variance indicated main effects for all independent variables except age and transport zone. A single 3 factor interaction was present for SOV x workplace type x sex. Between subjects effects were reported for intervention, workplace type, workplace, sex, and two 3 factor ANOVA between subjects effects for SOV x intervention type x workplace type type, and SOV x intervention type x sex. The significant results are summarised in table 8.6.1 below.
Table 8.6.1  Summary of significant ANOVA findings for SOV trips against independent variables.

<table>
<thead>
<tr>
<th>Independent variable</th>
<th>Main effect</th>
<th>Interaction</th>
<th>Between subjects effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intervention type</td>
<td>F(1,487)=2.142; p&lt;0.005</td>
<td>F(2,487)=6.643; p&lt;0.001</td>
<td></td>
</tr>
<tr>
<td>WP type</td>
<td>F(1,488)=5.778; p&lt;0.05</td>
<td>F(1,488)=6.996; p&lt;0.01</td>
<td></td>
</tr>
<tr>
<td>WP</td>
<td>F(1,484)=8.149; p&lt;0.005</td>
<td>F(5,484)=6.723; p&lt;0.001</td>
<td></td>
</tr>
<tr>
<td>Sex</td>
<td>F(1,479)=4.466; p&lt;0.05</td>
<td>F(1,479)=14.596; p&lt;0.001</td>
<td></td>
</tr>
<tr>
<td>Job type</td>
<td>F(1,485)=7.279; p&lt;0.01</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TPZ</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intervention type x WP type</td>
<td>F(1,484)=8.149; p&lt;0.005</td>
<td>F(2,484)=6.278; p&lt;0.005</td>
<td></td>
</tr>
<tr>
<td>Sex x WP type</td>
<td>F(1,477)=6.364; p&lt;0.05</td>
<td>F(1,477)=4.025; p&lt;0.05</td>
<td></td>
</tr>
<tr>
<td>Sex x Intervention type</td>
<td>F(1,475)=7.087; p&lt;0.01</td>
<td>F(1,475)=3.860; p&lt;0.05</td>
<td></td>
</tr>
</tbody>
</table>

SOV trips and intervention type

The mean number of weekly commute trips in each intervention group was reduced, as illustrated by figure 8.6.2. The greatest reduction occurred in the type B intervention, and the smallest change occurred in the type C intervention group.

Table 8.6.2 below presents the trip reduction data as a percentage of the total trips for each intervention group. As the goal for each program was set at a 10% reduction in SOV trips, it is clear that only the type B intervention was able to achieve the target.

Table 8.6.2  Trip reduction across interventions as proportion of workplace trips.

<table>
<thead>
<tr>
<th>Intervention</th>
<th>total trips</th>
<th>Time</th>
<th>SOV trips</th>
<th>% SOV trips</th>
<th>%change</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1470</td>
<td>1</td>
<td>491</td>
<td>33.40%</td>
<td>-4.01%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
<td>432</td>
<td>29.39%</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>1130</td>
<td>1</td>
<td>264</td>
<td>23.36%</td>
<td>-10.44%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
<td>146</td>
<td>12.92%</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>2300</td>
<td>1</td>
<td>761</td>
<td>33.09%</td>
<td>-1.48%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
<td>727</td>
<td>31.61%</td>
<td></td>
</tr>
</tbody>
</table>
Paired samples t-test revealed that the reduction in trips in the type B intervention was significant, while the smaller reductions in the type A and type C interventions were not significant (table 8.6.3).

**Table 8.6.3**  Paired sample t-test results for SOV trips.

<table>
<thead>
<tr>
<th>Intervention</th>
<th>t(df)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intervention A</td>
<td>t(146)=1.31</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>Intervention B</td>
<td>t(112)=2.52</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Intervention C</td>
<td>t(229)=0.15</td>
<td>&gt;0.05</td>
</tr>
</tbody>
</table>

It can therefore be concluded that there is a difference in the effectiveness of trip reduction by different educational interventions, with the type B intervention achieving the greatest reduction in SOV trips.
**SOV trips and Workplace**

When the between-subjects effect reported in table 8.6.1 for SOV trips x workplace type is examined in more detail it is clear that government workplaces have a greater mean SOV use both pre and post intervention than engineering workplaces’ (table 8.6.4) as illustrated in figure 8.6.3. Independent sample t-tests confirm that government workplaces’ mean weekly SOV trips are significantly higher than engineering workplaces’ (time 1:t(402.4) = -2.366; p<0.05; time 2:t(392.9) = -2.380; p<0.05).

**Figure 8.6.3** Between subjects effect: SOV trips and WP type. F(1,488)=6.996.

**Table 8.6.4** Mean SOV trips per week per person, time 1 and time 2.

<table>
<thead>
<tr>
<th>Workplace Type</th>
<th>SOV trips t1</th>
<th>SOV trips t2</th>
<th>change</th>
<th>Paired samples t-test results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineering</td>
<td>2.53</td>
<td>2.12</td>
<td>-0.41</td>
<td>t(181) = 1.713; p&gt;0.05</td>
</tr>
<tr>
<td>Government</td>
<td>3.43</td>
<td>2.98</td>
<td>-0.45</td>
<td>t(307) = 1.906; p&lt;0.05</td>
</tr>
</tbody>
</table>
In addition, paired sample t-tests (table 8.6.4) show that while the mean weekly SOV trips per person are significantly reduced in government workplaces (p<0.05), the engineering sample falls outside the accepted 95% confidence interval (p=0.088). This confirms that while the collective government workplaces have a higher mean SOV use, they achieve a significant reduction in SOV use. It therefore appears that there is a difference in the commuting behaviour of different types of workplaces.

The between-subjects effect reported in table 8.6.1 for SOV trips x workplace when examined in detail shows that different workplaces had very different mean SOV trip behaviour, and different responses to the intervention as illustrated in figure 8.6.4 below.

Figure 8.6.4  Between subjects effect: SOV trips and Workplace. F(5,484)=6.723

The level of mean trip reduction in the participant workplaces ranges from a reduction of 1.21 trips per person per week to as low as 0.08 trips per person per
week (table 8.6.5). Paired samples t-tests showed that only one workplace, Bg, achieved a significant reduction in trips (table 8.6.5).

Table 8.6.5  SOV trips time 1 and time 2.

<table>
<thead>
<tr>
<th>Workplace</th>
<th>SOV trips t1</th>
<th>SOV trips t2</th>
<th>change</th>
<th>paired samples t-test results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ae</td>
<td>3.64</td>
<td>3.35</td>
<td>-0.29</td>
<td>t(73) = 0.646; p&gt;0.05</td>
</tr>
<tr>
<td>Ag</td>
<td>3.04</td>
<td>2.52</td>
<td>-0.52</td>
<td>t(163) = 0.270; p&gt;0.05</td>
</tr>
<tr>
<td>Be</td>
<td>1.43</td>
<td>0.67</td>
<td>-0.76</td>
<td>t(41) = 1.636; p&gt;0.05</td>
</tr>
<tr>
<td>Bg</td>
<td>2.87</td>
<td>1.66</td>
<td>-1.21</td>
<td>t(70) = 2.012; p&lt;0.05</td>
</tr>
<tr>
<td>Ce</td>
<td>1.98</td>
<td>1.67</td>
<td>-0.31</td>
<td>t(65) = 1.002; p&gt;0.05</td>
</tr>
<tr>
<td>Cg</td>
<td>3.84</td>
<td>3.76</td>
<td>-0.08</td>
<td>t(72) = -1.209; p&gt;0.05</td>
</tr>
</tbody>
</table>

**SOV trips and sex**

The final between subjects effect of interest is for sex x SOV trips. As figure 8.6.5 illustrates, females make a greater mean number of SOV trips per week than males on both occasions. Females also show minimal reduction in the number of SOV trips over the intervention period while the male sample significantly reduce their trips, t(286)=2.825; p<0.005.
**Figure 8.6.5**  Between subjects effect: SOV trips and sex. F(1,479)=14.596.

**SOV trips, Sex and Workplace type**

The significant interaction between workplace type and sex as reported in table 8.6.1 is due to the female sample in both engineering and government having a higher mean number of SOV trips than males in each workplace type, while the government workplace sample (both male and female) has a higher number of SOV trips than engineering workplace sample. This is illustrated in figure 8.6.6.

**Figure 8.6.6**  SOV trips, workplace type and sex. F(1,477)=4.025.
**SOV trips, Sex and Intervention**

Females also have higher mean SOV use in two of the three intervention groups, as figure 8.6.7 illustrates. Independent samples t-tests report a significant difference between the mean SOV trips of males and females in the intervention B group (t(108) = -2.754; p<0.01) and the intervention C group (t(206) = -3.775; p<0.001). There is no significant difference between the mean SOV use of males and females in the type A intervention group.

**Figure 8.6.7**  Mean SOV trips across sex and intervention type.

![Graph showing mean SOV trips across sex and intervention type.]

8.7  **Types of Behaviour Change**

When the sample is examined in terms of negative and positive change some interesting observations can be made. The tables below shows the percentage of each intervention group which changed their behaviour by either reducing SOV trips, increasing SOV trips (change -), or did not change their behaviour at all (no change). This is calculated based on the number of SOV trips made per week so that the ‘no
change’ sample may have changed their behaviour from one green transport to another, but their overall number of ‘green’ trips remained the same over the intervention period.

Table 8.7.1 Breakdown of behaviour change.

<table>
<thead>
<tr>
<th></th>
<th>Intervention A</th>
<th>Intervention B</th>
<th>Intervention C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decreased SOV trips</td>
<td>21.10%</td>
<td>26.50%</td>
<td>18.30%</td>
</tr>
<tr>
<td>No change</td>
<td>63.30%</td>
<td>51.30%</td>
<td>63.90%</td>
</tr>
<tr>
<td>Increased SOV trips</td>
<td>15.60%</td>
<td>22.10%</td>
<td>17.80%</td>
</tr>
</tbody>
</table>

As can be seen from table 8.7.1 there was a large proportion in each sample group that changed their behaviour, both positively and negatively. While the mean number of SOV trips is a useful measure of success in terms of overall trip reduction, it does not give a clear indication of how participant behaviour is changing. Here it is clear that there is a large proportion of participants who are making a positive change in their transport use, in the sample as a whole 21% of people reduced the number of weekly SOV trips they made. This is largely counteracted by the 18.2% of people who increased their use of the SOV, but it is important to recognize that a large group of individuals did make a positive change.

It is possible to surmise that the percentage of participants who changed positively over the program were influenced by the program as the qualitative data supports this idea. It is unrealistic however to think that the entire group of individuals who increased their use of SOV did so as a negative response to the program. It is more likely that this proportion of the sample were engaged in green commuting behaviour previously but became dissatisfied due to a perceived or real lack of government
support or infrastructure for alternative transports. This would have been further complicated during the period of this research by the particularly high profile construction of a large freeway bridge across the river into the city.

8.8 Perception of intervention success/effectiveness (research question 1.1.5)

As part of the post intervention survey participants were asked if they felt the TravelSmart Workplace program was effective. The resulting qualitative statements could be grouped into four categories. These categories and the proportion of participants in each program who commented accordingly are summarised in table 8.8.1 below.

Table 8.8.1 Summary of effectiveness statements.

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Positive</th>
<th>Partly</th>
<th>Negative</th>
<th>Don’t know</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type A</td>
<td>54%</td>
<td>12.7%</td>
<td>28.4%</td>
<td>4.9%</td>
</tr>
<tr>
<td>Type B</td>
<td>48.5%</td>
<td>15%</td>
<td>29%</td>
<td>7.5%</td>
</tr>
<tr>
<td>Type C</td>
<td>54%</td>
<td>11.8%</td>
<td>23%</td>
<td>11.2%</td>
</tr>
</tbody>
</table>

As table 8.8.1 indicates there was not a lot of difference in the proportion of individuals who felt the program was effective in each intervention group. The major difference between the programs was that more people were uncertain of effectiveness in the Type C group, and less people felt negative about the program effectiveness.

When comparing the positive statements from each intervention group a striking difference is in the sense of potential action. While there was a strong sense of improved awareness and some change in behaviour in the type A and type B intervention groups, there was also a strong undercurrent of futility about the efforts
due to overwhelming external barriers. The type C program comments included a number of references to problem solving, and increased responsibility and a feeling that it is possible to ‘make a difference’. Examples of some of these statements are given in table 8.8.2 below.

**Table 8.8.2** Positive opinion of effectiveness.

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Example statements</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>“The program was effective in that it certainly made more people aware of the pollution caused by cars. I have noticed a number of fellow employees changing their travel arrangements since the survey began...” (532.7) “Yes - but people tended to think it was not their problem so therefore attendance at seminars was low. People need to be made more aware (somehow) and know that they can make a difference.” (227.1)</td>
</tr>
<tr>
<td>B</td>
<td>“Yes - it got people to walk and ride and carpool to work more effectively, because things were made more organised, especially with carpooling. It has to become more widely promoted and known through television adverts, newspapers etc...” (44.3) “Yes - but it seems pointless in the long term because the government is giving a higher priority to the road system and car users at the expense of the public transport system and cycle/walkways. eg widening of freeway. I am a regular car user and although my answers here look selfish I am aware of the need to change and will soon reassess my transport use.” (294.5)</td>
</tr>
<tr>
<td>C</td>
<td>“Raised awareness as to the issues. Provided opportunities to problem solve those issues.” (1505.11) “Very effective in highlighting the issues of smog and car use and making people see that it is their responsibility and they can make a difference.” (1183.10)</td>
</tr>
</tbody>
</table>

Similar trends to those seen in the positive statements are present in the collection of statements from participants who felt the program was only partly effective (table 8.8.3).
### Table 8.8.3  Partly effective statements.

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Example statement</th>
</tr>
</thead>
</table>
| **A**  
12.7% | “Reasonably but not effective enough to get me to use another form of transport - I feel you are fighting an uphill battle...” (180.1)  
“in terms of changing habits - not very effective. In terms of education and making people aware of alternatives it was...” (558.7.185) |
| **B**  
15% | “effective in communicating issues to staff and increasing awareness of transport alternatives. Cannot be effective on its own though without implementation of complementary actions such as freeway tolls for single occupancy cars...Need intro of more comprehensive transport system including train line down south, increased bus routes and reduction in city parking.” (25.3)  
“Created awareness of situation - smog, air pollution. Traveling by bus and train adds an hour to my journey - park 'n' ride is best for me. Would prefer to travel all the way by bus or train but it is not an option..” (736.2) |
| **C**  
11.8% | “made me feel a little guilty using the car. But I must consider my family and convenience first. I cannot consider walking or cycling, I have children to pick up & also do other errands after school (+work). So I suppose I'm saying I would like to use these alternatives but it is not practical at the moment, so the workplace program had an effect, but didn't alter my habits! (The bus service is not adequate for my needs.)” (1413.11)  
“Only moderately so. The message has to go out to the masses. It must be more forcibly put across. We are all very hard to shake off our old habits.” (1209.10) |

In the type A intervention a number of participants stated that while it was effective in raising awareness it was not effective in achieving behaviour change, generally no emotive statements were given. Statements from the type B group on the other hand tended to include a defence for the perceived lack of change in behaviour generally, often providing suggestions for what they felt was needed to alter transport behaviour in Perth, or specific reasons why alternative transport is not practical for them. The statements from the type C group tended to be more reflective, including a justification for their own behaviour, but reflecting on a new sense of willingness.
to use alternatives, or the difficulty of changing habitual behaviour, as the statements in table 8.8.3 indicate.

In contrast, the negative statements (table 8.8.4) tended to be similar across all the interventions, unlike the positive and partly positive statements.

**Table 8.8.4  Negative statements.**

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Example statement</th>
</tr>
</thead>
</table>
| A 28.4%      | “I clearly understood the issue and benefits but it was not effective for me as I still prefer the convenience of driving to work...” (211.1)  
“I will take more than questionnaires and brochures to change a culture of a city which is dependent on motor vehicle transport.” (473.7)  
“I don't think it has been effective as most people are using the same travel methods as before. Whilst TravelSmart has brought about an awareness of the air quality problem, people are selfish by nature as a whole and will use travel methods that are cost effective and convenient to themselves.” (241.1) |
| B 29%        | “At most I think it raised people’s awareness. The focus should be on making Public Transport options cheaper and more convenient and reliable and also on providing safe cycleways along all major routes. I doubt people will change their habits until these issues are addressed.” (1650.13)  
“Sorry, but it largely passed me by.” (1587.13) |
| C 23%        | “perhaps needed to be more obvious - apart from occasional newsletters and posters it wasn't very visible.” (1282.11)  
“We saw very little literature. I didn't even know a transport committee had been meeting at our place!” (1255.10)  
“ No. The level of support by senior management was not very evident but I assume this is because they are all supplied with govt vehicles and so this campaign does not effect them. Also while the local councils continue to provide reasonably priced parking we will not see a dramatic increase in PT.” (1396.11) |

In general, individuals who felt the program was unsuccessful either claimed that there was too many reasons not to change their use of the car, both external barriers
such as service provision and safety and internal barriers such as convenience and laziness, or that they had not noticed the program and therefore it was not effective.

Similar to the lack of difference across the negative statements, the ‘don’t know’ statements (table 8.8.5) reflected common themes across the interventions. Either participants simply did not know if there was an effect, or they had not been present throughout the intervention due to secondment, leave or working outside of the main workplace building.

Table 8.8.5  Don’t know statements.

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Example statement</th>
</tr>
</thead>
<tbody>
<tr>
<td>A 4.9%</td>
<td>“I don’t know if it has had any effect...” (491.7)</td>
</tr>
<tr>
<td>B 7.5%</td>
<td>“Unable to comment as I was away during the TravelSmart Workplace program.” (13)</td>
</tr>
<tr>
<td>C 11.2%</td>
<td>“Don’t know - haven't seen any sign of the results.” (1381.11.147)</td>
</tr>
</tbody>
</table>

Interview responses did not show as much variety in response as the survey statements provided, but there was a clear difference in response from the three different intervention groups.

When participants in the type C intervention were asked: ‘Do you think the plan, or the process of preparing it, helped raise awareness of travel alternatives in the workplace?’ the responses were overwhelmingly positive. Representative examples of interview responses include:

“ It raised awareness for those involved” RPW12:49;
“I think so yeah, I mean when you start looking at the amount of pollution and the amount of cents per km between public transport and private transport, all those sorts of indicators certainly made people aware of how much it is actually costing them and the environment, so I think there should be more of a permanent support for it.” RPW12:115;

“if you were to look at the numbers of cyclists and stuff that we have in the building at the moment... we're certainly up a lot more than we were this time last year. They have had to install additional locking facilities - bars we can lock the bikes against downstairs. We have had additional lockers and that so our end of trip facilities are a lot better, theres more lockers for everyone, we have got a large bulk amount so that's like - it gives people less excuses as to why they 'can't' do that sort of thing, you know - I cant get a locker....” FPW11: 187.

When asked ‘Why do you think this?’ the reasons given for the perceived success seemed to focus on the nature of the process in which participants were involved in.

For example:

“ It's because they had to question themselves about what way the could help change, help remove a barrier or.... They had to sit there thinking of it. It was very involving.”  CGW9:201

“I mean people talk! That's the way it is. I think the people believed in the initiative. You didn't have to go out on a sales pitch, if you had done we probably would have ignored you - we don't want a flashy product, we want a process that
works and makes us a better community. It was more about gently raising awareness and developing skills to make changes. There was no pushing or demanding but a lot of positive reinforcement. Encouragement. It was a really good atmosphere to work with. The organisation never had to feel threatened or defensive because you had handed the ownership over and with that the responsibility, but you were still there to advise and support and encourage. you did not leave them in the lurch or allow them to become overwhelmed.” HWW9:61; and

“Because our project was by the people, for the people and it made a difference. It was about ownership.” HWW9:19.

An assessment of success gauged by behaviour change was sought by asking ‘Do you think the plan has reduced car trips/driver only trips to and from the workplace? Comment on how.’ Most interview responses suggested there was a noticeable change in behaviour and that greener transports were being used. For example:

“Yes definitely. In a lot of ways.... And its still making an impact. People are definitely using public transport more to get to work and for work trips.”
CGW9:532;

“Yes, I don't know if I can actually quantify that but I think it has. From what I see and what people say to me, to Nic, to others, It has had an influence. I think its twofold. Its had an influence in changing some peoples methods of transport and also it had an influence on making people aware of the options and the impact on the environment and that sort of thing. And that may be something that they might not
act on right now but its something that is at least in the back of their mind and maybe one of the things that helps to influence changing their way in the future. For some of them they will keep thinking about it,” FPW11:528.

Interview responses from the type A and B interventions were quite different. When asked if they thought the program was effective in their workplace, the comments suggested some success in awareness raising and minimal action in the type B group, but a quite negative perception in the type A group.

For example, a type A workplace interview comment was:

“This program was not effective as we have staggered work hours and are not always able to use public transport. As most of our employees live over 10kms from the workplace, cycling is not an option. We are also not able to car-pool because no one can guarantee their finishing time. The program was not applicable to us.” (PWW4:8).

In contrast, a type B workplace interview comment was:

“It didn't change my transport behaviour because I am already aware of the issues, we got a fair bit of positive feedback, to some of the activities, there was a lot of positive feedback to the breakfast, we had some positive feedback to the environmental, the volunteers, that was seen as useful by some people, I think there was interest in the program. …I suspect what came out of it in terms of this agency, this is just my perception, but I think it was very useful in raising awareness in this agency. …they’re starting to implement some things, recycle car trips and trips for this week, notices around and there just been a few little things happening and I
suspect that the program last year may have been very useful in raising awareness among staff, those sorts of things are starting to happen.” (GJW2:96).

Interestingly, while the response from the type A group focused on barriers such as work hours and distance from work, when asked how they would change the TravelSmart program to be more effective, the response was focused on financial incentives rather than changes in physical and work conditions. For example:

“More advertising and incentives to car-pool etc, reducing parking fees at Wilsons car-parks would be a good idea.” (PWW4:22).

In contrast, the type B workplaces focused on the need for continued support and feedback. For example:

“One of the problems I’ve got with the way the program was run is that there has been no follow-up, the thing was completed around about last September, what were the results? how did we go? you know, was it effective? I think a big downfall or something that needs to be addressed is that you can’t run these programs and move in and out without giving feedback. If you want to reinforce behaviour, encourage people to keep doing the right thing you can’t do that. That was what I was really disappointed about.” (GJW2:100).

These contrasting views from interviews of employees in different intervention groups strongly suggest the interventions have different levels of impact.

8.9 Evaluation of educational tools

In terms of the specific aspects of program delivery, different strategies were appreciated by different intervention groups. The following section examines
participant feedback on the effectiveness of the display, brochures, newsletters, workshops/seminars, volunteers, and the green transport plan.

*TravelSmart Display*

The display was well received by the management and welcomed as a visible presence in the workplace. The majority of survey respondents from all three intervention groups felt the display was either ‘useful’ or ‘useful sometimes’, as illustrated by figure 8.9.1.

**Figure 8.9.1** Usefulness of TravelSmart display.

![Figure 8.9.1](image)

Some participants also made positive comments regarding the display. For example a type A participant reported that the display was effective because: “*yes - people stopped and read display - made them think. It was well displayed and kept up to date - people looked for it when it was taken away... People absorb little bits of info...*” Q16:150:496.7. An intervention C participant commented that: “*The display was good and the information was practical and easy to use.*” CGW9:194. In contrast, another intervention C participant found the display was the
only aspect of the program that they were aware of: “Apart from the display nothing else was obvious.” Q162000:73

Despite the positive implications of the responses to how useful the display was, comments from all three intervention groups more frequently tended to focus on accessibility and a lack of effectiveness in engaging behaviour change. A comment from a type B intervention participant highlighted how easily a program can be ineffective for a proportion of the target audience if they avoid being exposed to the material. Examples of such comments for each intervention group are presented in table 8.9.1.

Table 8.9.1 Participant comments on problems with TravelSmart display.

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Example Statement</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>“The display could have been located in a more accessible area. More workshops/seminars would have been welcome.” Q16:45:179.1. “display was in wrong area - needs to be in each department.” Q16:50:188.1. “I don't believe a newsletter and static display are enough to encourage staff to participate. A more enthusiastic and pro-active approach may have resulted in greater participation. Travel decisions are based more on cost and convenience than environment” Q16:95:291.5</td>
</tr>
<tr>
<td>B</td>
<td>“I didn't see too much of the program! Apart from the display in the building’s foyer, I wouldn't have know there was a TravelSmart program.” Q162000:269 “Not really effective. The displays could be easily &quot;ignored&quot;.” Q162000:235</td>
</tr>
<tr>
<td>C</td>
<td>“I think there should be more of a permanent display of that sort of information. Having it up there for the short time was OK, but I think people tend to forget rather quickly. I think it should be more of a permanent issue.” SJW11:119 “I understand that a display was set up in X but this is not suitable for the outside workforce.” Q162000:60 “Apart from the questionnaire the only item listed above that I saw or heard about was the display in the foyer which was quite subtle.” Q162000.1542.11:205</td>
</tr>
</tbody>
</table>
**TravelSmart information brochures**

Information brochures were perceived as more useful to the type A intervention group than any other group as figure 8.9.2 illustrates. Only a small proportion of participants in each intervention found the information brochures ‘very useful’.

**Figure 8.9.2** Usefulness of TravelSmart information brochures.

As with the display, some participants commented that they were not aware of the information brochures, while others reported that the information brochures were the only part of the program they experienced. For example:

“I wasn't aware of any of the elements of the TSW initiative apart from the brochure.” Q16:182.1484.11.

“The program was not very visible, the noticeboard was static at work and I did not see the other aspects of the program so rated them not useful.” 1095.9

One participant reported that the: “Brochures were interesting.” Qu16:50.188.1, while another felt that: “It will take more than questionaires and brochures to change a culture of a city which is dependent on motor vehicle transport.” Q16:142.473.7.
A theme which emerged from type A workplaces only was the nuisance value of receiving TravelSmart Workplace material through the internal mail. A number of comments were made to volunteers throughout the program and participants also commented on this issue in the survey. For example:

“the extensive amount of brochures became a nuisance and a waste of trees - they were not read and most people disposed of them automatically. A few copies at communal places would have been more appropriate.” Q16:97.296.5.

Comments such as these are of interest as they seem to exaggerate the amount of paper material provided. The “extensive amount of brochures” consisted of four DL size leaflets and four A4 size newsletters, which were distributed over a five month period; amounting to approximately one brochure and newsletter every four weeks. Despite this, the distribution of information in the type A workplaces was a common issue of concern to the volunteers also, with a theme emerging of uncertainty about whether the information brochures were actually reaching the participants. For example:

“I had to rely on them to put brochures into internal mail for the duration of the program as I couldn't do it myself. There is no way I can be sure they all reached every employee & that they weren't just thrown in the bin. Once I asked for the orange (cycling) brochure, to be placed in the internal mail and then the next week I came in they were on the table near my display.” SFG99:111

It seems that in general, while the type A intervention participants felt the brochures were most useful, this same group also had a negative reaction to the distribution of
information in this way which was not evident in the responses from participants of type B and C interventions.

**TravelSmart Newsletters**

The TravelSmart Newsletters also received a mixed appraisal from participants, with some praising their content and usefulness, while others felt they were dry and boring. For example: “I got newsletters but they were dry. Need more imaginative methods to bring widespread attention to the problems..” Q16:57.206.1., in contrast with: “timetables and newsletters were helpful for me...” Q16:221.640.2.

There were also comments that only the newsletter aspect of the program reached some participants, as with the display and the brochures, such as: “I only saw the newsletter.” Q16:154.1404.11. Again, the type A intervention participants found the newsletter more useful than the other two intervention groups, as figure 8.9.3 illustrates.

**Figure 8.9.3** Usefulness of TravelSmart newsletters.

![Bar chart]

Some comments about the newsletter focused on presentation/medium and content, making suggestions about what would be more useful. For example: “It would have
been useful to receive newsletter or something via e-mail which I could have read when I had time.” Q16:163.1432.11; and: “More information by newsletters etc including some tips would have been nice.” (Q16:275.1694.13).

There was some evidence to suggest that the newsletters were used successfully by the volunteers to make and sustain contact with the employees, and there was a sense from the volunteers that the participants enjoyed reading the newsletters. For example:

“Most people were keen to accept the newsletters and would read them when they received them - perhaps they were bored with work. Many were defensive or pretended to be busy on the phone, but overall people were receptive and enjoyed a conversation when they were not busy.” SFG 99:209;

and

“As usual when people get to know you they become more receptive and (mostly) friendlier towards me. There were comments about changes to the program, more rejections of literature (although most still enjoyed the newsletter). Because there was less literature in the later weeks there was less to encourage contact with employees.” SFG99:219.

TravelSmart Workplace Workshops and Seminars

The workshops and seminars which were presented in all workplaces were well received by management, but there was an extremely low level of attendance in general. The largest number of participants in any workplace who attended a workshop or guest speaker was 28. In most cases, the better attended seminars were those where the workplace had provided lunch and advertised via internal email. It
is clear from the survey responses that the majority of participants did not find the workshops or seminars useful (figure 8.9.4), however, this is likely to be due to the low attendance rate.

Figure 8.9.4 Usefulness of TravelSmart workshops and seminars.

The unanimous theme across all comments regarding the workshops and seminars was time limitations preventing attendance. For example: “I didn't have time to get to any seminars.” Q16:163.1432.11.

The workplace representatives were generally positive about holding workshops, and encouraged promotion of guest speakers. For example, in one interview a participant went into detail about how well received a Transperth speaker at a question and answer forum was: “…people like X coming along. Those who came along really enjoyed it because he could give answers there and then. Those who didn't come after finding out about it after really regretted it.” FPW11:603
Overall the biggest problem with the seminars and workshops was attendance. Low attendance rates significantly reduce the effectiveness of these events as educational tools since only a small proportion of the target audience may be able to participate.

**TravelSmart Workplace Volunteer**

The volunteers who visited the workplace appear to have only been useful to a half of the sample in each intervention group (figure 8.9.5). This may indicate that while the volunteers believed they were attending to the whole workplace, they may not have actually been able to interact with all the employees.

**Figure 8.9.5** Usefulness of TravelSmart volunteer.

As with the other aspects of the program there were a number of participants who commented they were not aware of the volunteer. For example:

“..*didn't know of volunteer or workshops*”  Q16 : 206.7; and

“*what travelsmart workplace volunteer?..*”  Q16:177.545.7.
Other participants admitted they were aware of these resources but chose not to participate. For example:

“the literature provided useful information. ...but I did not participate in workshops or meet volunteer.” Q16: 39.158.1; and

“I have not accessed the displays, workshops or seminars or the Travelsmart workplace volunteer.” Q16: 144.474.7.

Lack of time during the work day was again raised by a number of participants who reported that there was inadequate time at their workplace to participate in education programs such as TravelSmart Workplace. One participant felt that there was not enough time to stop and talk with the volunteer:

“It is hard to find time in your working day to stop and chat to the TravelSmart volunteer...” Q16: 139.421.6.

In general, a large proportion of the comments regarding the volunteer were positive, including suggestions that the volunteers were responsible for maintaining awareness in the workplace. Some examples of positive feedback include:

“regular contact made you aware of the situation especially when the volunteer walked around. It kept it in your mind to try to do something for cleaner air...” Q16: 132.396.6;

and

“I liked the small team approach (rather than the top down same-old HSE plan bulls..t). I couldn't believe the enthusiasm of the volunteers who provided momentum and support.” Q16: 38.1091.9.
The workplace representatives in the type B and type C workplaces were generally very appreciative of the volunteers, and comments they made during interviews highlighted their positive opinion of the role of the volunteer in the workplace. For example:

“the volunteers were great, we had heaps of feedback.” CGW9:546;

and

“The volunteers were good. Especially if resourcing is an issue, which it was for us and probably is for others too. And when they came they were easily recognisable - unlike someone in a suit and tie. Identifiable and approachable. A bright shirt and the logo continuing so that next time they see the logo it jogs their memory of what it is all about.” FPW11: 612.

Overall, the qualitative data suggests that participants who did have contact with the volunteers felt they were useful, while the proportion of the workplace that did not engage in the program and access the volunteers felt they were not useful.

**Green Transport Plan**

The green transport plan was only a part of the type C intervention group so the responses regarding its effectiveness are from a smaller sample than the responses regarding the other educational tools. As figure 8.9.6 indicates, the majority of the sample felt that the green transport plan was either useful or useful sometimes. Still a large proportion of the sample (27%) felt the plan was not useful. Again there were some comments from type C participants that they had not heard of the green transport plan, such as:

In contrast, there were other comments which indicated not only an awareness of the existence of the green transport plan, but also showed hopefulness at what the planning process may be able to achieve in the longer term. For example:

“Effective in raising awareness & developing GTP which will hopefully act as a catalyst for institutional changes aimed at removing barriers to alternative transport.” Q16.1264.11.

During the post intervention interviews participants were asked: ‘Would you encourage other organisations to develop and implement a Green Transport Plan?’ Responses tended to be highly positive, but interestingly they cited many different reasons for their strong support ranging from a transport change outcome to associated benefits for the workplace, as well as a veiled criticism of the governments’ seemingly schizophrenic policies on car use. For example:

“Yeah yeah, I would yeah - I guess it's a structured way of getting green transport changes implemented in a workplace, involving people...” CGW9:564;
“Certainly. I think the benefits to the organisation is huge. Well, the awareness it creates, from the environmental aspect to the physical benefits.... I think if you can sell it on those type of things” FPW11:594;

“For sure. I would be very happy to talk with anyone from an organisation who is considering it and wanted to chat with someone who had done it before.”

HWW9:146; and

“Yes, it was well worth it. People don't know what they are missing. If I run home sometimes I will see a car right out here and I will be 5 kms out of town on a side street before they come hacking past.” RPW12:299.

Interestingly, one participant qualified their statement of support for the future of such programs, suggesting that they felt there was some sort of hypocrisy in the existence of the government driven program:

“I think if the government was serious and got behind it...then by all means.” SJW11:230.
8.10 Summary of Chapter

The main findings presented in this chapter can be summarised as follows:

- Table 8.10 summarises the significant changes which occurred over the nine month intervention period in each intervention group;

<table>
<thead>
<tr>
<th>Paired Samples (t1; t2)</th>
<th>Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
</tr>
<tr>
<td>Knowledge location</td>
<td>*</td>
</tr>
<tr>
<td>Attitude 1 location</td>
<td></td>
</tr>
<tr>
<td>Attitude 2 location</td>
<td></td>
</tr>
<tr>
<td>Efficacy location</td>
<td></td>
</tr>
<tr>
<td>SOV trips</td>
<td></td>
</tr>
</tbody>
</table>

* significant at the 0.05 level
** significant at the 0.01 level
*** significant at the 0.001 level

- Knowledge was increased in all three intervention groups, but most significantly increased in intervention B;
- Information only does not influence attitudes to car use and air quality;
- General environmental behaviour decreased significantly in all intervention groups;
- Efficacy increased, but not significantly in any intervention group;
- SOV trips were significantly reduced in the type B intervention only;
- Participants from each intervention group perceived the program similarly in general, however the content of the feedback suggests that the participants are more satisfied with the type C program with regard to opportunities for problem
solving and opportunities to ‘make a difference’, as opposed to a sense of futility of change underlying comments from type A and B participants;

- Table 8.10.2 summarises the significant changes which occurred over the nine month intervention period in each workplace and workplace type group;

**Table 8.10.2** Summary of significantly changed person factors in workplaces and workplace type (t-test summary).

<table>
<thead>
<tr>
<th>SUMMARY</th>
<th>Engineering workplaces</th>
<th>Engineering group</th>
<th>Government group</th>
<th>Government workplaces</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ae</td>
<td>Be</td>
<td>Ce</td>
<td>Ag</td>
</tr>
<tr>
<td>Knowledge location</td>
<td>***</td>
<td>**</td>
<td>***</td>
<td>***</td>
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<tr>
<td>Attitude 1 location</td>
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<tr>
<td>Attitude 2 location</td>
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<tr>
<td>Efficacy location</td>
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</tr>
<tr>
<td>SOV trips</td>
<td></td>
<td>*</td>
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</tr>
</tbody>
</table>

* significant at the 0.05 level  
** significant at the 0.01 level  
*** significant at the 0.001 level

- Workplaces have different levels of pre-intervention knowledge; and  
- Government workplace type increased attitude significantly while engineering did not.
9.1 Organisational Culture Characteristics and their impact on intervention.

Organisations were examined using the list of characteristics outlined in Robbins et al. (1994) as presented in chapter 4. The six organisations were compared and placed on a continuum for each of the ten characteristics, using evidence from documentation, observation and case notes as well as some volunteer comments and interview data (section 5.8). The location of organisations on a continuum for each characteristic, and a description of the influence of the characteristic on the interventions are presented in the next section.

**Member identity**

The member identity characteristic considers the degree to which employees identify with the organisation as a whole rather than with their type of job or field of professional expertise. Workplaces are located on a continuum between individuals being completely job focused, or completely organisation focused (figure 9.1.1).

In general, workplaces with a more developed organisational identity seemed to be more positive and enthusiastic about the program. There was a greater appreciation of the concept that more people can make more of a difference through only a small personal change. In contrast, organisations with participants who were completely job focused appeared to find the program irrelevant to them, and viewed it as a waste
of time and resources, for example a participant from Ae commented: “This program seems to be a waste of money and paper - perhaps this money (and trees) could have been saved to go towards an improved public transport system.” (Q16.1.87).

Figure 9.1.1  Workplace location on member identity continuum.

<table>
<thead>
<tr>
<th>Job</th>
<th>Organisation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cg</td>
<td>seemed to be the least corporate minded, and this was even mentioned by a staff member during interview. Each job was seen as an individual entity rather than a part of the larger picture. The job could exist without the organisation.</td>
</tr>
<tr>
<td>Bg</td>
<td>also seemed very job focused with little emphasis on team building or organisational identity.</td>
</tr>
<tr>
<td>Ae</td>
<td>was relatively job focused to the outsider also, however, according to the organisation events there was a reasonable amount of team activities, and a focus on the corporation as an identity rather than a collection of different jobs.</td>
</tr>
<tr>
<td>Ag</td>
<td>seemed slightly more organisation focused than Ae with an effort being made by the human resources section to support and develop a corporate identity, and focusing on individuals as part of the larger body rather than isolated individuals.</td>
</tr>
<tr>
<td>Be</td>
<td>was very organisation focused, with high value placed on employee participation in broader organization endeavours.</td>
</tr>
<tr>
<td>Ce</td>
<td>was the most organisation minded, with high value placed on achievement as a unified group of people sharing a common goal.</td>
</tr>
</tbody>
</table>

**Group Emphasis**

The group emphasis characteristic considers the degree to which work activities are organised around groups rather than individuals. Workplaces are located on a
continuum between work activities being always individualised and work activities always being a group effort and responsibility (figure 9.1.2).

Workplaces with a greater proportion of team/group based work activities tended to engage in more discussion regarding the program in the workplace. This did not seem to greatly influence the implementation or success of the type A and B programs, but was very important in the type C intervention as a team effort was required to develop the green transport plan.

Figure 9.1.2 Workplace location on group emphasis continuum.

<table>
<thead>
<tr>
<th>Individual</th>
<th>Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cg</td>
<td>Be</td>
</tr>
<tr>
<td>Bg</td>
<td>Ce</td>
</tr>
<tr>
<td>Ag</td>
<td></td>
</tr>
<tr>
<td>Ae</td>
<td></td>
</tr>
</tbody>
</table>

Four of the six workplaces seemed to generally operate through individual work activities rather than group work activities. Cg was the most individual focused, and Ae was the least individual focused.

Be was more team work focused and there was a lot of collaborative work observed during visits.

Ce was the most group focused, also with a lot of collaboration and group responsibility for work activity present in the work environment.

People Focus

The people focus characteristic focuses on the degree to which management decisions take into consideration the effect of outcomes on employees within the
organisation, as opposed to being solely focused on the production resulting from completion of tasks (figure 9.1.3).

**Figure 9.1.3** Workplace location on people focus continuum.

<table>
<thead>
<tr>
<th>Task</th>
<th>People</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bg</td>
<td>Cg</td>
</tr>
<tr>
<td>Ae</td>
<td></td>
</tr>
<tr>
<td>Ag</td>
<td>Be</td>
</tr>
</tbody>
</table>

These two workplaces were very task focused. The management orientation seemed only interested in productivity or political efficiency rather than the employees’ welfare and workplace morale.

This workplace was also very task focused, but there was slightly more investment in employee wellbeing.

These three workplaces were more people oriented than others, with management strategies in place to consider employee ideas and concerns, and significant investment in the wellbeing of employees. There was still a reasonable proportion of task focus, but there was certainly more of a balance than the other workplaces.

Workplaces with greater concern for employees’ welfare tended to have a more supportive management approach to the program. In workplaces where a health safety and environment policy existed there was a higher level of management approval as the program and its outcomes could be seen as ways to improve existing health safety and environment targets. Also, in the more employee focused workplaces there was a management view that investing in employees was wise. For example: “*There is a management lean towards cost effectiveness, but empowering your employees does not cost you any money. It makes sense. My experience is that it is very easy.*” HWW9.
**Unit Integration**

The unit integration characteristic considers the degree to which units within the organisation are encouraged to operate in a coordinated or independent manner.

Workplaces are located on a continuum between workplace sections/departments working in complete isolation and independently, to departments interacting with each other with work activity requiring interdependence to be completed (figure 9.1.4).

**Figure 9.1.4** Workplace location on unit integration continuum.

| Independent | These three workplaces were characterised by isolated sections or departments. While work material did pass between departments in its progress toward completion, there was no personal interaction as usually material moved through internal mail. Participants from Cg and Bg explained:

> “in here we don’t work as a single entity. There is a very much a, well there was, probably still is… a silo management structure, so each one tends to work independently. Well, here just on this floor, there is probably at least 4… different workplaces and different work areas responsible to different line of management and everything, so everything is a bit fragmented and as I said, with that silo effect, a lot of them, whatever they are doing…” SJW11:310; and

> “I think each division, branch and that becomes quite insular, there’s not a lot of interaction.” FPW11:102.

| Ag | was a balance of independent and interdependent sections. While units within the organisation were generally independent, there was significant personal interaction between the units though as tasks were passed on, or through work activities designed to incorporate as much of the workplace as possible. One or two departments were slightly more isolated than others.

| Be | was more interdependent, although there were still isolated sections within the organisation.

| Ce | had a greater level of interaction between departments, even with sections of the organisation in different buildings across Perth. Once again there were still a few sections that were more independent, although interaction was encouraged.

**Interdependent**
In general the less integrated workplaces were more difficult to communicate with, particularly in interventions B and C where the volunteers found it difficult to deliver material. In workplace Cg one volunteer noted in their journal:

“I have not seen these people before (we found a new part of the building we did not know was there). The secretaries seemed to think that we were major security risks and that we were not authorised to be in the workplace trying to talk to the employees. Security obsessed!” CPVJ.W11.

In less integrated organisations strategies to encourage discussion of the issues amongst employees did not work very well.

**Control**

The control characteristic is focused on the degree to which rules, regulations and direct supervision are used to oversee and control employee behaviour. Workplaces are located on a continuum between loose employee control and tight employee control (figure 9.1.5). As figure 9.1.5 illustrates, there is a clear split between the government and engineering workplaces in this characteristic.

In general, more relaxed control and supervision seemed to go hand in hand with more self-motivated employees, who were able to manage their own time to fit in extra-curricular activities such as TravelSmart events.
Risk Tolerance

The risk tolerance characteristic considers the degree to which employees are encouraged to be aggressive, innovative and risk-seeking, rather than maintaining current ideas and practices and avoiding ideas and innovations that may result in major change. Workplaces are placed on a continuum between a high level of risk tolerance and a low level of risk tolerance (figure 9.1.6). As with the control characteristic, a clear split exists between government and engineering organizations, which may be due to the type of work.
Risk tolerance did not seem to impact greatly on the interventions, although there appear to be strong links between this and the two characteristics of control and conflict tolerance. It is possible that the low level of risk tolerance discourages employees from thinking creatively about new ways to do things within a workplace.
**Reward Criteria**

The reward criteria characteristic focuses on the degree to which rewards such as pay increases and promotions are allocated according to employee performance rather than seniority, favoritism or other non-performance factors. Workplaces are placed on a continuum between completely performance based rewards and non-performance based rewards (figure 9.1.7). Once again the workplaces are divided into government and engineering.

**Figure 9.1.7  Workplace location on the reward criteria continuum**

<table>
<thead>
<tr>
<th>Performance</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ae</td>
<td></td>
</tr>
<tr>
<td>Ce</td>
<td></td>
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<tr>
<td>Be</td>
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</table>

The three engineering workplaces had reward systems which were highly performance based, with financial rewards such as bonuses and promotions, and social rewards such as attendance of special functions and lunches, for achievement and development. Interestingly there were rewards for achievements in personal areas such as fitness and health as well as productivity.

<table>
<thead>
<tr>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ag</td>
</tr>
<tr>
<td>Bg</td>
</tr>
<tr>
<td>Cg</td>
</tr>
</tbody>
</table>

In the three government organisations there were no reward systems in place. Financial rewards were gained based on the number of years in employment, or other qualifications. There were no bonuses or performance based rewards.

This organisational characteristic did not seem to be of great importance in the type A program, but there appeared to be an impact in the type B and C intervention groups for engineering organisations. Both workplace Be and workplace Ce had an active health safety and environment (HSE) policy where employees were...
encouraged to improve and maintain health and fitness. In both organisations employees were encouraged to set physical activity goals and were rewarded for meeting them. In both cases some employees began using alternative transport as a way of increasing their physical activity. In another example, the Ce employees were rewarded for winning a company environmental award for the work they had done on developing the green transport plan and its related initiatives.

**Conflict tolerance**

The conflict tolerance characteristic focuses on the degree to which employees are encouraged to air conflicts and criticisms openly, as opposed to maintaining an image that nothing is wrong. The workplaces are placed on a continuum between low conflict tolerance and high conflict tolerance (figure 9.1.8).

**Figure 9.1.8** Workplace location on conflict tolerance continuum.

The level of conflict tolerance, and strategies used to deal with interpersonal conflict were fairly similar in all the workplaces. The main difference was in the way engineering workplaces encouraged criticism of current work practices openly, in order to improve and develop, hence they are placed closer to high conflict tolerance than the government workplaces.
The difference in levels of conflict tolerance in workplaces made little difference in the type A and B intervention. In contrast, the increased encouragement to ‘think outside the box’ and bring different ideas to the attention of managers or superiors was important in the type C engineering workplace. The planning process was more of a struggle in workplace Cg where the employees would begin self censoring ideas and concepts as they felt they were too challenging for management and would result in the whole plan being dumped. There are similarities here with risk tolerance.

**Means-ends orientation**

The means-ends orientation characteristic considers the degree to which management focuses on results or outcomes rather than the techniques and processes used to achieve those outcomes. The workplaces are located on a continuum between being totally means focused and totally ends focused (figure 9.1.9). It was difficult to locate the workplaces on this continuum as there was a range of conflicting evidence for a number of the workplaces. In general all workplaces had a strong ends focus, as in all cases the end product was of importance to the organisation. However, in some organisations there was also value placed on the process by which the end was achieved.

Only one workplace commented on the process of participating in TravelSmart Workplace as an important aspect for achieving change. The other workplaces which were more focused on the ‘end product’ tended to be disappointed if the program did not automatically deliver the achieved goal of transport reduction.
Open Systems Focus

The open-system focus characteristic considers the degree to which the organisation monitors and responds to change in the external environment. The workplaces are placed on a continuum between having a completely inward looking (internal) focus, and having a completely outward looking (external) focus (figure 9.1.10).

This characteristic did not seem to influence the interventions.
Figure 9.1.10 Workplace location on the open systems focus continuum.

Internal

Cg was the most inwardly focused workplace, with a large amount of effort being applied to internal restructure. One interviewee commented:

“The constant change disempowers employees in this workplace … I mean, at one time there was a restructure on average about every 18 months… and since the early 90’s I think there has been about 6.” SJW11357

Ce Be Ae

These three workplaces had a reasonably equal balance of internal and external focus, with business plans and annual reporting incorporating employee and stakeholder needs, and exhibiting a willingness to adapt to new and changing situations.

External

Ag Bg

Both these workplaces had a slightly more external focus, largely due to the nature of the work the organisation was based around.
9.2 Workplace Case Notes

Throughout the implementation of the TravelSmart Workplace interventions a journal was kept by the researcher where observations and comments were recorded (section 5.6). A file of case notes for each participant organisation was kept as a part of this journal, from which a brief summary for each workplace could be generated. These are presented in the following sections.

Workplace Ae

Despite enthusiasm from the top management who arranged for the organisation to participate, there was a lack of leadership and support from middle management. This was characterised initially by indecision about which department was responsible for the TravelSmart Workplace program, and who was going to act as office contact and liaise with the program coordinator. Essentially there was support for the ‘idea’ of TravelSmart Workplace, but this was not followed through in practice, a trend which continued throughout the intervention period. The organisation’s liaison person did not take the program very seriously, and had commented on a number of occasions that it was unlikely to have any influence on the employees’ travel behaviour. The workplace volunteer had often noted the contact person was ‘negative’ in their volunteer journal. This essentially meant there was no workplace champion for the program.

The organization had a pleasant working environment, with all employees located in the one multiple storey building. Despite the close location of the workplace to major public transport centres, a large number of free car parking spaces were
provided for employees, and a comparatively high number of company vehicles were provided.

There was some difficulty in communication of events and information to the employees. As no mass email messages were allowed to be sent from the coordinator, everything had to be sent out through the workplace contact. It was therefore unknown how much information actually was sent and received by the employees. The promotion of events and information was also limited by the location provided for the display, which was even commented on by employees as being ‘out of the way’.

In general there was a very low participation level for all program events, and the final breakfast was not held due to the contact person refusing to have one. There was no commitment at the workplace level to the program either, with no queries about addressing workplace policy, and the role of company vehicles in the reduction of single occupant vehicle use. The results showed that while there was a 9% increase in the use of public transport and a small increase in walking and cycling, overall the use of single occupant vehicles actually increased by 0.68%. Carpooling decreased, along with use of park ‘n rides.

Overall there was no significant reduction in the mean weekly single occupant vehicle trips, and no new initiatives were implemented at this workplace.
Workplace Ag

This workplace initiated contact with a formal letter from the Executive Director after receiving the invitation to participate. The first contact after invitation was met with a positive and enthusiastic response from the Human Resources section within the department which had taken on the role of liaising with the program coordinator. Despite the nominated contact person changing three times during the intervention period, the enthusiasm and momentum was not diminished. The contact person was always very helpful and the workplace volunteer reported that people went out of their way to accommodate the program and its needs. The organization as a whole seemed comfortable and committed to these sorts of ‘public education’ programs. At one point the contact person was requesting more information to distribute, and more events to be arranged.

The workplace environment was always busy, often seeming a little crowded, but had a welcoming, friendly and sociable atmosphere. The employees were located in a single multiple storey building. The building was located at the end of the central city free transit zone, approximately 2 km from major public transport centres. There was a proportion of company vehicles, and a small amount of parking available for those vehicles. The workplace was located near a large and cheap car park, where there was also a discounted rate for carpool vehicles.

In general there was a good level of participation, the workplace did a good job in promoting TravelSmart events to its staff, and there was a good turnout for workshops and seminars compared to other workplaces. Email contact was allowed and so information was easy to distribute quickly and efficiently. The volunteer was
popular with staff, who often approached to chat during maintenance of the display and notices. This was more contact than the volunteer in Ae had with staff.

The workplace achieved a high level of change, and requested to keep display material so it might continue to promote alternative transport, suggesting a positive outlook. Despite this, a change in government and departmental restructure and relocation resulted in this momentum not being maintained.

No real changes were observed in workplace policy. There were comments from some participants about the need to address company car use and some employees requested a designated car pool bay, but none of these suggestions were actioned.

**Workplace Be**

This workplace responded to the invitation to participate in TravelSmart Workplace with enthusiasm. Top down leadership and management support for the program was made clear early on. The contact person who had been delegated to liaise with the program coordinator was a strong leader for the program within the organization. The highly positive and enthusiastic workplace contact provided environmental leadership for the employees and modeled the transport behaviour change (environmental leadership already exists).

Positive management of environmental issues etc. The workplace volunteer reported that:

“The workplace contact, X, was very helpful and spent most of the 3 hours that I was there every week speaking to me. He sent internal e-mails to all the
employees every week to let them know that I was in the office and also let them know when events were coming up.”

One difficulty which arose was that when the contact person was not at the workplace the volunteer had difficulty getting in and moving around. It seemed the success of the program was dependent on the contact person.

The workplace was located on two floors of a large high rise building which it shared with a number of other organisations. The building management had recently introduced fees for bike parking, and there were very limited end of trip facilities in general. The workplace has an existing health and environment program in place which TSW complements, so the approach to educating employees is already accepted within the organisation. There seemed to be a generally positive attitudes toward environmental issues throughout the workplace, although there was often some joking about the stereotype of engineers having no concern for environmental issues. The volunteer was very confident and quickly developed a rapport with the employees.

There was high participation rates in the activities provided as part of the program. All the seminars and workshops were attended very well. The workplace contact provided sandwiches for those attending, which it believed increased the attendance dramatically. There was a positive change in trip behaviour (-2.31% SOV) despite the already low use of SOV. No changes were made to policy or practice at an organisational level, although the teleworking policy was reviewed (it seems it had been forgotten about), and there was one report of an employee being motivated to write a letter regarding parking for carpooling.
**Workplace Bg**

Part of this workplace had previously been involved in the TravelSmart program trial run a few years earlier and this workplace was not invited to participate but requested involvement in the type B intervention. The organisation was politically involved in transport issues. The main interest in the program was generated from one section within the organisation: a small group of individuals in the workplace who were committed to sustainable transport, rather than higher levels of management which were not as supportive. The workplace contact person who was a part of this section was supportive and helpful, although there were many restrictions placed on what the volunteer could do within the workplace. The workplace contact felt that there was a generally negative view to use of alternative transports and the paradigm was set more towards effective engineering solutions. Despite this, the contact put a large amount of effort into promoting the program and encouraging management to address sustainable transport issues within the workplace.

The organisation was located in a single multi storey building within walking distance of major public transport centres within the city. The volunteer found it difficult to mingle with all the employees as they were spread out over seven floors, but was effective despite the large size of the workplace. The workplace had a large number of company vehicles, and a large amount of parking provided for employees. In general the working environment was friendly and welcoming, and easy to move around in. The level of support for TravelSmart activities varied during the working year due to major projects.
There were some difficulties in direct communication as email for direct information distribution was not permitted. It is notable that even a participant commented: “The TSW program could have been improved by accessing the Dept's e-mail system on a more regular basis. ie weekly updates.” Despite this, the workplace had a reasonable response to workshops and seminars. Attendance ranged from a few to many. No free lunch was provided by the workplace, but the workplace contact believed that would have been helpful in boosting attendance. Interestingly, the employees seemed to be divided in opinion about alternative transport use depending on the section within the organisation for which they work.

This workplace achieved the highest level of change overall compared to all other workplaces. There was a strong push from parts of the workplace to make changes to support alternative transport use, but these were not actioned within the research period. The workplace contact believed more support was needed from the program if such changes were to be achieved. There was some indication of support for further involvement in workplace efforts to encourage sustainable transport use.

**Workplace Ce**

Contact was initiated through the invitation letter to the chief executive officer (CEO), but a follow up phone call was made to a director within the organization who was known to be interested in the program. It later became apparent that the program was run without official approval from the CEO. Despite this the program met with support from middle management and the group of individuals who chose to participate in the green transport planning process were very positive and enthusiastic. A number of the motivated individuals had a personal goal – to lobby
against the recently increased cost applied to provision of end of trip facilities for cyclists. The main contact person was enthusiastic and helpful, initially coordinating the workplace meeting times and locations for the green transport committee as well as arranging for the volunteers to be inducted.

The organisation had two main office buildings in the city centre, one of which was the main participant. The focus workplace was located on four floors of a large high rise office building in the centre of Perth less than 1km from each of the major public transport centres. Despite the large size of the organisation there was limited shower and locking facilities for building tenants, with a charge being introduced for secure bike parking.

There was a high level of company car use, but also a very positive view from management regarding the health and well-being of employees. A health safety and environment program was in place, with a part of the program being encouragement to participate in and develop environmental programs as a part of the organisations environmental stewardship effort.

**Workplace Cg**

Initial contact was followed by a very slow and frustrating process of trying to determine if the program had been approved. One section of the workplace did not seem to know what was happening in the other, and this resulted in a drawn out process of relaying messages between sections of the workplace in an attempt to get the intervention process started.
Once contact had been established with the nominated employee the program ran fairly smoothly. The contact person was enthusiastic and organised, and while he often seemed to be under a large amount of pressure he always made time to attend meetings and help the volunteers with anything they needed within the workplace. The workplace contact delegated some responsibility to colleagues early on which gave the program extra support and was the beginning of the development of a small team within the workplace which then became the green transport committee.

One volunteer was far more professional than the other in the approach to the employees and presentation of materials around the workplace. The volunteers for Cg lacked confidence in general, and this sometimes lead to a lack of interaction between employees and the volunteers. This was exacerbated by the size of the workplace, and the difficulty navigating the various sections within the organisation. The high level of security also caused some problems as the volunteers had difficulty accessing different sections within the workplace.

There was wide interest in participating in the development of a green transport plan, but only five employees actually managed to attend and participate in the whole process. A number of actions were implemented throughout the intervention period as a result of the green transport planning process, including: review and update of teleworking policy; human resources (HR) publication and promotion of teleworking; additional lockers installed; additional bike locking facilities installed; and a green transport plan (GTP) was completed and approved as a result of the program.
9.3 Summary of Organisational Change Outcomes

Qualitative data collected through observation during the intervention period and
interviews one year after the conclusion of the interventions were collated and
examined. From this data it is possible to identify a series of outcomes that are
comparable across the three interventions. Five areas of particular focus emerged as
suitable to use in comparison of organisational change due to the educational
interventions. These five areas are:

1. Changes made to organisational policy as a result of TravelSmart Workplace
in an effort to encourage alternative transport use in the workplace;
2. Level of workplace personnel participation in the leadership, promotion and
development of TravelSmart workplace initiatives within the workplace;
3. The allocation of additional resources (either financial or ‘in kind’ such as
employee time) and support applied to the program by the workplace in order
to achieve the set goal of SOV trip reduction;
4. Support and encouragement for employees to maintain or take up alternative
transport behaviour, for example through the implementation of initiatives, or
management communication of approval of alternative transport use; and
5. Commitment to the continuation of the program initiatives after conclusion of
the intervention.

These outcomes, summarised in table 9.3.1, show a trend of minimal achievement in
the type A program to more substantial long term outcomes in the type C program.
Table 9.3.1  Summary of observations in participating workplaces.

<table>
<thead>
<tr>
<th>Type A</th>
<th>Type B</th>
<th>Type C</th>
</tr>
</thead>
<tbody>
<tr>
<td>No policy changes</td>
<td>TravelSmart concepts incorporated into HR or HSE policy.</td>
<td>Changes made to HR &amp; HSE policy and generally implemented.</td>
</tr>
<tr>
<td>No employee involvement</td>
<td>Generally dependent on one employee coordinating workplace aspect of program.</td>
<td>Progress driven by 2 to 15 or more employees: Less chance of stalling.</td>
</tr>
<tr>
<td>No additional support or resources applied to program</td>
<td>Generally no additional support or resources applied to program.</td>
<td>Additional resources and support provided through GTP committee.</td>
</tr>
<tr>
<td>No additional encouragement</td>
<td>No longer term support</td>
<td>Long term support provided through approval of GTP by management</td>
</tr>
<tr>
<td>No effort to maintain program post intervention</td>
<td>No continuation of program post intervention</td>
<td>Continuation of program through implementation of green transport plan.</td>
</tr>
</tbody>
</table>

The significantly greater organisational change achieved by the type C intervention suggests that the more involving intervention incorporating the green transport planning process is far more effective in achieving these organisational outcomes.
9.4 Summary of Chapter

The main findings presented in this chapter can be summarised as follows:

- Organisational culture characteristics vary between the participant organisations;
- Some of the organisational characteristics (member identity, group emphasis, people focus, unit integration, control, conflict tolerance) influence intervention implementation and effectiveness while others (risk tolerance, reward criteria, open system focus) did not;
- Review of case notes indicated that while all workplaces could be categorised using the cultural characteristics, there were unique situations, circumstances and events in each workplace which influenced the implementation of the interventions; and
- There was a clear pattern of increasing achievement of organisational change with increasing leadership and involvement, with the type C program achieving the most significant ‘long term’ outcomes.
Chapter 10

Motivations and Barriers to Transport Behaviour Change

A range of qualitative data including responses to the questionnaire, interviews and focus groups were used to determine the main motivations and barriers influencing single occupant vehicle choice. This chapter will first examine the reported motivations for mode choice, followed by the reported external barriers to alternative transport use, and finally the observation of narrative as an effective motivation tool.

10.1 Motivations for mode choice

As table 10.1.1 reports, the most common reason for mode choice across the whole sample was convenience. Convenience was more commonly the main reason for mode choice in the 5 to 9 and 10 SOV trips/week group representing 59.7% and 54.5% of those groups respectively, as opposed to 44.3% and 41.1% of the 0 and 1 to 4 SOV trips/week groups. For participants making 10 SOV trips per week the next most popular reason for mode choice was other (14.9%), followed by length of travel time (11.9%). In contrast, 13.5% and 18.9% of the 0 and 1 to 4 SOV trips/week groups selected exercise as the main reason for mode choice, followed by 12.6% and 14.7% who selected cost. In general it appears that the four major motivators for mode choice, excluding ‘other’, are convenience, exercise, cost, and travel time.
Table 10.1.1  Motivations for mode choice in four SOV use frequency groups.

<table>
<thead>
<tr>
<th>Reason for mode choice</th>
<th>SOV trip groups</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Exercise</td>
<td>13.5</td>
</tr>
<tr>
<td>Convenience</td>
<td>44.3</td>
</tr>
<tr>
<td>Cost</td>
<td>12.6</td>
</tr>
<tr>
<td>Environmental concerns</td>
<td>2.6</td>
</tr>
<tr>
<td>No car available</td>
<td>3.1</td>
</tr>
<tr>
<td>Run errands at lunch or after work</td>
<td>1.2</td>
</tr>
<tr>
<td>Enjoyment</td>
<td>2.4</td>
</tr>
<tr>
<td>Comfort</td>
<td>0.9</td>
</tr>
<tr>
<td>Length of travel time</td>
<td>5.5</td>
</tr>
<tr>
<td>Access to cheap/free parking</td>
<td>1.7</td>
</tr>
<tr>
<td>Car needed for work purposes</td>
<td>5.2</td>
</tr>
<tr>
<td>Live close to work</td>
<td>1.7</td>
</tr>
<tr>
<td>Other reasons</td>
<td>5.5</td>
</tr>
<tr>
<td>TOTAL</td>
<td>100.0</td>
</tr>
</tbody>
</table>

10.2  **External Barriers to alternative transport use**

In addition to the main reasons given for mode choice in table 10.1.1 from the survey, a number of external barriers to alternative transport use and behaviour change emerged from the qualitative data. The barriers that featured prominently in comments regarding the effectiveness of the TravelSmart programs included external and internal barriers, and are listed in table 10.2.1 below. All references to barriers in these statements were volunteered and were not directly asked for in any questions. Each of these barriers is examined in more detail with example statements in the following sections.
Table 10.2.1 Barriers to behaviour change volunteered in interview and survey data.

<table>
<thead>
<tr>
<th>Barrier</th>
<th>Statements</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>External</strong></td>
<td></td>
</tr>
<tr>
<td>Parenting responsibilities</td>
<td>17</td>
</tr>
<tr>
<td>Household/errands</td>
<td>5</td>
</tr>
<tr>
<td>Work hours/responsibilities</td>
<td>20</td>
</tr>
<tr>
<td>End of trip facilities</td>
<td>39</td>
</tr>
<tr>
<td>Company car</td>
<td>4</td>
</tr>
<tr>
<td>Workplace culture</td>
<td>13</td>
</tr>
<tr>
<td>Cost</td>
<td>47</td>
</tr>
<tr>
<td>Safety/security</td>
<td>26</td>
</tr>
<tr>
<td>Distance</td>
<td>3</td>
</tr>
<tr>
<td><strong>Internal</strong></td>
<td></td>
</tr>
<tr>
<td>Convenience</td>
<td>25</td>
</tr>
<tr>
<td>Government decisions</td>
<td>31</td>
</tr>
</tbody>
</table>

**Parenting**

A total of 17 text units made a direct reference to parenting duties and its impact on mode choice. In general statements regarding parenting were phrased in such a way as to suggest that if it were not for the children the participant would use an alternative. For example:

“if I had another choice than driving my car to work I would do so but unfortunately I have to get the children to two different schools but at least I only have one car, and make one trip to and from.” Q16:1281.11.107;

“I would prefer to travel by bus but it is not possible because I take two small children to daycare before work...” Q16 : 203.7; and

“I cannot consider walking or cycling, I have children to pick up … So I suppose I'm saying I would like to use these alternatives but it is not practical at the moment.” Q16:1413.11.157.
In another example a participant made a point of noting that although they used the car for transport, it was well cared for. This indicates value placed on the reduction in emissions from a well tuned car. So the participant is saying – well, I do the wrong thing, but I don’t do it ‘as wrong’ as some people:

“some people like me need to drop off and pick up children at school. It would make my life very different if I didn't use my car at least 3 times per week. The car is however, always tuned and well maintained.” Q16:1298.11.114.

Interestingly, only one of the 17 statements incorporating parenting duties was made by a male participant. This could account for the significant between subjects effect reported in chapter 8, and suggests that parenting duties have a significant impact on the transport choice of females.

**Household/Errands & Hours/ work responsibilities**

Errands and work responsibilities were both reasons for driving which participants volunteered in the survey responses. The use of alternative transports for social or errand trips was seen by some as unrealistic and impractical, for example:

“public transport is inconvenient and you often can't get to where you need to go when you have to be there. Younger people who socialise, play sport after work will find that cycling and walking are not practical.” Q16: 314.5.

This highlights the importance placed on the freedom people experience through the reduced need for planning and the option to make last minute decisions when car-based transport is available. The need to complete errands was used as justification for not using alternative transports for the commute trip, despite some participants
clearly stating that they feel the issue of car based transport and its impact is an important one:

“made me feel a little guilty using the car. But I also do other errands after school and work.” Q16:157.1413.11

Similarly, the impact of alternative transport availability in non traditional work hours impacted on participants ability to reduce single occupant vehicle trips despite their concern for the environment:

“I feel I will be unable to change my practices until the PT system becomes more effective outside core hours… I am concerned about the environment but I have no alternatives to use at this point in time.” Q16:122.1323.11.

Another issue associated with both work responsibilities and the need to run errands was the difficulties arising from the reduced cargo capacity of most alternative transports. This is a serious issue for employees who need to transport materials and for people wishing to complete errands between home and work, such as food shopping or sporting activities:

“The TSW program is a good idea but I cannot change my ways its too inconvenient lugging heavy or bulky bags on public transport.” Q16:1060.9.

The length or timing of work hours was another frequently reported reason for inability to reduce single occupant vehicle use. A number of participants commented on the length or uncertainty of work hours. For example:
“we have staggered work hours and are not always able to use public transport. We are also not able to car-pool because no one can guarantee a finishing time.”

PWW4:9;

“did not reach many people - not because of lack of information or availability of opportunities but because of the nature of work hours” Q16:99.305.5; and

“until public transport is improved or working hours are reduced rather than increased, reliance on private vehicles will remain...” Q16 :81.265.1.

End of trip facilities

A particularly physical constraint reported by participants was a lack of end of trip facilities. Participants mentioned a range of problems arising from too few or no showers, inadequate locker facilities for storage of clothing and washing gear, and lack of secure parking and locking space for bicycles. For some participants the lack of facilities created a significant physical barrier. Typical comments included:

“Personally, practical strategies such as provision of lockers would have a greater influence on my transport choice. If lockers provided it would make it easier to cycle or walk to work.” 1449.11;

“It is fine to walk/cycle, but what about when you get to work. Nothing has been said about shower and change room facilities. Where do you keep your bike?” Q16:103. 1273.11; and

“That's a big barrier, when you only have one shower you have to stagger your showers, which for 100 people can take a long time!” NBW3 : 316.

A few participants commented on the need for secure bike parking at bus and train stations. For example:
“Need bike lockers at train stations and shower facilities at work.” Q16:172.537.7.

Participants from Type A and B interventions tended to comment that more focus on workplace barriers was needed. For example:

“Need more emphasis on employers. Lack of showers and secure lockers for bikes do not help. Good on you for trying.” Q16:165.525.7.

In contrast, a participant in the type C program commented that the program was effective because it addressed the end of trip facility issue:

“Provided an impetus to arranging office based facilities to be more accessible for cyclists” 1570.12.

One participant was recorded noting the importance of the end of trip facilities for her in maintaining her choice of cycling as a commuter transport:

“she travels from South Perth and rides because it takes about the same time as driving and her work has good showers etc.” Lobs2000:6.

**Company car**

The availability of company vehicles was reported as a significant incentive to drive for those with the privilege, and a symbol of company approval for car use by participants who did not have access to a company vehicle. For example:

“as long as my employer provides either free parking and/or government cars to a group of employees (ie. managers etc.) there is little incentive to use public transport.” 561.7.
There was some tension evident regarding the use of company vehicles, and some interesting value judgements about the sort of people who were awarded company vehicles. For example:

“Those with company cars make no effort - it is always left to 'others' to make the difference.” Q16:253.766.2.

This issue seems to be linked with a more general issue arising from the perception that addressing car dependency and air quality issues is the responsibility of the government. This will be examined below with other internal barriers.

**Culture**

Comments regarding culture had a dual focus. The majority of comments referred to the difficulty of changing behaviour which was so entrenched in current society. For example:

“*It will take more than questionnaires and brochures to change a culture of a city which is dependent on motor vehicle transport.*” Q16:142:473.7;

“*It is a very tough culture you are trying to change. Keep up the good work!*” Q16:118:1309.11;

“*You’re talking about changing the whole culture, their way of thinking.*” GJW2:84; and

“*it will be a long and difficult process to change travel patterns of Australians. The reliance on cars will remain for at least this generation.*” Q16:155.503.7.

The second focus of comments incorporating culture was the more specific culture within the workplace itself. For example:
“It would also help if Bg management didn't hassle someone for dressing a little casually because they walk to work.” 699.2

“Employers need to support organisational change and workplace changes to support staff working from home. and still believe if considered lazy or evading work if you do not turn up, mainly by peers.” Q16:1454.11; and

“Need to find a way of working with agency executive re culture and policy.” Q16:224.656.2.

Comments such as these suggest that employees feel the dual effects of workplace culture, with driving being the social norm resulting in low levels of acceptance of dress and working from home, and policy which does not support changes within the workplace towards sustainable transport use.

A positive comment was made by a participant from the Ce workplace who explained that the existing culture allowed the TravelSmart message to be delivered effectively, as there was already clear approval from the organisation for any health safety and environment initiatives which encouraged increased personal responsibility and involvement in environmental and health issues:

“involving people... it's a flow on to the HSE culture aspects in the workplace as well which is important. A more personal understanding of responsibility and all aspects of that kind of thing...” CGW9 : 567.

Unsupportive workplace culture and/or management practices

Workplace culture was observed by the volunteers and researcher as having a significant impact on success across all intervention types. Workplaces with a strong health, safety and environment (HSE) department, policy or program appeared to be
the best targets as they already had a workplace culture which valued these areas in addition to the usual focus on economic based productivity. As one intervention C interviewee noted:

"There is a management lean towards cost effectiveness, but empowering your employees does not cost you any money. It makes sense. My experience is that it is very easy." (HWW9).

Management involvement was important to the level of success and the motivation of the employees, but it was the employees themselves who had to be involved, committed and empowered to drive the process within their workplace. This was initially a struggle as all those involved were uncertain of what would be required, or the relevance of their skills and understandings, but that was part of the process. As one interviewed participant reported:

"I guess in terms of the process, it was really largely us who set in the end how we developed them, which was probably the best way to do it but it meant that it went a bit slower. We had to come to the realisation that we had to pull it together, it was not quite so obvious that that was what was going to have to happen, so people were stumbling in the dark a little bit I guess...... it probably could come quicker, but whether it would be as effective I don't know.... " (CGW9).

The success in establishing a green transport planning committee in the participating workplaces that had either the full support of, or representation from senior management was a strong factor in success. The workplaces that formed a cohesive team to set and work towards achieving goals tended to achieve more and maintain their own momentum in the process. The workplace that most successfully achieved
this is still maintaining the committee to implement and improve on the green transport plan (GTP). There is strong commitment from management now, and the GTP has been integrated into the business plan. In workplaces where an effective committee was not formed within the first few months the planning process was a far greater struggle and more dependent on the facilitators. Some of these workplaces have still managed to have their plan approved and are working towards implementing it, but progress is taking much longer which may be reflected in the trip reduction figures for intervention C.

Participants in all interventions felt that the support from an external body was essential in order to achieve change in transport behaviour. A number of reasons were given including motivation to act (deadlines and competitions), someone empathetic to talk to about difficulties, and access to resources:

"I think the external support, like the resources from DEP, and people that know about green transport modes and can identify with the barriers that are there because of their knowledge of what the transport industry has..... And in terms of access to information.... Like knowledge of where to get information from, who is out there whatever, it would have taken a lot more energy from someone within our workplace without the knowledge to go and chase up someone...it’s very time consuming if you don't know who exactly to chase up for particular information"

(CGW9).

Cost

A major issue which emerged from the data was the importance of the perception of cost. Interestingly the sample was divided in opinion as some comments give cost as
a reason for using a single occupant vehicle, while others state that cost is a reason for using alternatives.

Comments that report the cost of alternative transport as a negative tended to focus on public transport. For example:

“Public Transport for me and my family is neither time or cost effective in terms of where and when we need to go.” Q16:173.1457.11;

“Make Public Transport more cost effective and I will use it. Traveling from Ocean Reef with my wife, it is considerably cheaper to drive. Walking / riding 30kms not an option.” Q16:250.1638.13;

“We need the cost of public transport to come down.” Q16:176.544.7;

“If public transport is more readily available and is cheaper than using your car then I believe more individuals may utilise it.” Q16:204.7; and

“Money should be spent on improving the quality and reducing the cost of PT rather than this sort of b.s. If public transport is worthwhile then people will use it!” Q16:144.1376.11.

In contrast, other comments referred to the cost of parking and fuel as significant disincentives to using a car for transport. For example:

“I only take the bus to work because of parking costs and because I do not have to travel at night.” Q16:77.1201.10; and

“The cost of fuel has had a higher impact than the program.” Q16:153.1400.11.

Only one comment which referred to cost placed relaxation above the importance of cost or convenience:
“Travelsmart workplace program was useful - I find the bus is just as relaxing as taking my car and the cost a little bit less.” Q16:51.190.1.

Safety

Safety or sense of personal security was raised throughout the program as an issue, particularly by employees in workplaces slightly further away from the centre of the city, or those who worked outside of usual business hours. One participants’ comment provided a large amount of detail:

“Paths between X train station and Cg are inhabited by unsavory individuals, the footpaths are broken and uneven and the tunnel is littered with mud and debris when it isn't under water. The area is of third world standard, with people of questionable repute accosting passers by for money or cigarettes or to insult them. I refuse to walk around there after dark, having already been threatened with violence and observing others endure the same - all at the local bus stop at work!” Q16:164.1433.11.

This was an issue raised during workplace focus group too, with one participant highlighting her concerns for the safety of her children:

“I know as the mother of a 12 year old daughter I would have to step in… if she wants to go on her bike or walk I would have to go with her.. you just wouldn’t let your kids walk anywhere on their own. My daughter actually starts high school next year and we are sort of tossing up what to do, and I know that buses run and things but you do really worry because they have to change buses and things, and its not as safe a society as even when I was at school and I’m not that old! And I really worry about her… you know.. I just take her to school and it means at least you know if you’ve dropped them off at school they are there, and they are in one piece. Even if
they are cycling there is so much traffic on the road, and there is congestion and people drive fast and you just wouldn’t know if they got to school safely.”

(SBW7:16)

**Distance**

Distance was also raised by a number of participants throughout the interventions as an issue, and a few participants commented on the problem in the survey. The distance barrier was not raised as often as it might have been, and interestingly was not only a problem for cycling, but also for use of public transport. Examples of comments regarding distance include:

“*I am committed to using my motorbike because of the distance I come to work. (30 minute trip as against 75 minute trip because of tortuous bus route).*”  Q16 2000:5.1007...9; and

“*I would cycle to work but distance is a factor, and time, weather, lack of changing facilities. I intend to cycle at least once a week during summer...*”  Q16:167.528.7.

**Convenience**

In addition to the issues arising from external barriers such as those discussed above, there was considerable evidence that internal barriers were preventing consideration of behaviour change in the sample. Comments regarding convenience developed a number of patterns. The most notable was the large proportion of the comments which focused on problems with public transport, giving reasons why it was inconvenient to use. For example:
“The TSW program is a good idea but I cannot change my ways, it’s too inconvenient lugging heavy or bulky bags on PT or catching buses/trains after dark.” Q16:27.9;

“The focus should be on making PT options cheaper and more convenient and reliable and also on providing safe cycleways along all major routes. I doubt people will change their habits until these issues are addressed.” Q16:252.1650.13;

“not helpful for me - buses are dirty, irregular and drivers don't know the routes. Nothing has changed.. not convenient to reduce car based transport” Q16:101.307.5; and

“public transport is inconvenient and you often can't get to where you need to go when you have to be there.” Q16:103.314.5.

In contrast a few individuals made positive comments about the convenience of public transport:

“I use PT because it is more convenient to me.” Q16:192.1504.11;

“I use public transport and it isn't inconvenient at all”. Q16:150.496.7; and

“made me seriously think about changing my mode of transport to work. Public transport not convenient from my home but Park ‘n’ Ride is...” Q16: 157.505.7.

Finally, the largest proportion of comments focused on the general perception of car use as being more convenient:

“People will always try to save time and choose what is more convenient for them - simple as that.” Q16: 88.1230.10;

“People use mv's for the convenience and it is difficult to think behaviour would change to a large extent through a marketing campaign.” Q16:168.1444.11;
“People will only switch to alternative mode of transport if it is attractive to do so without affecting the comfort and convenience levels.” Q16:95.1257.10;

“I clearly understood the issue and benefits but it was not effective for me as I still prefer the convenience of driving to work.” Q16:59.211.1; and

“not effective from my viewpoint - it is very convenient to drive to work and I will continue to do so.” Q16:70.240.1.

It is clear from the qualitative data that participant perception regarding the convenience of SOV use is one of the more significant issues influencing mode choice. This supports the quantitative survey results presented in table 10.2.1.

**Government responsibility and decision making**

In the type A and B groups particularly there was a strong focus on a belief that the government was not sufficiently contributing to or managing alternative transport. This suggests:

1) that the participants were unwilling to take responsibility for their own behaviour and looked to blame a ‘higher power’ for their own inability to address the change; and/or

2) that there are significant external barriers to alternative transport in the Perth region, that fall under the responsibility of the government to address.

In either case, the comments are a symptom of disempowerment. The statements both in content and character are indicative of individuals who feel an inability to deal with the issue themselves and feel that action is required from a more powerful body than themselves, and the logical target for this desired action becomes the
government. Example statements from each intervention group are provided in table 10.2.2.

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Example statements</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>“This program seems to be a waste of money and paper - perhaps this money (and trees) could have been saved to go towards an improved public transport system. ..” 0.1. “until the public transport system becomes a more viable option for commuters in the middle/outer suburbs, you could be ‘flogging a dead horse’. ” 575.7.</td>
</tr>
<tr>
<td>B</td>
<td>“I don't think there was enough information about the poor PT system in Perth. Too much ganging up on car users as bad people or lazy people. Need a better rail network then I'd take PT to work.” 1627...13. “There should have been more emphasis on what the govt is doing to increase alternative travel options.” 1671...13. “There is no suitable public transport in Perth. Until money is spent on providing it instead of spending more money on the facilities for cars this campaign is a complete waste of resources...” 355.5.</td>
</tr>
<tr>
<td>C</td>
<td>“More determined effort required by govt / society to reduce use of private vehicles for travel to work”. 1022..9 “Need a real gov commitment to PT, trains etc. riders / walkers.” 1040...9. “Governments have a responsibility - how about LPG cars, the pollution of a coal powered power station. We only have petrol driven cars because it is a revenue raiser. Why no LNG buses?” 1080..9. “It is up to the government to put in place the logistics to ensure 1) public transport is cheap, effective and available; 2) motor vehicle manufacturers to design alternative engines that are fuel efficient/emission safe, etc; 3) communities are planned economically and family friendly, etc.” 1149.10.</td>
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Connecting through narrative

A recurring observation throughout the interventions in all workplaces was the effectiveness of story telling, both telling second hand stories to new groups, and the process of individuals sharing their own story. Telling the story of another persons’ experience resulted in a far more enthusiastic or thoughtful response. The sharing of stories made the behaviour being discussed relevant and imaginable to the participants who felt it was either unimportant or too difficult for them to bother about. Two examples of stories recorded in the case files are presented here.

Example 1: In workplace Be there was a male participant who approached the program coordinator to thank them for the program and told the following story. He had a 10 year old son with whom he did not know how to communicate very well. By the time he came home from work his son was usually in front of the computer or television, and on the weekends he was off with friends, or doing his own thing at home. If they did have time together it was often characterized by silence as neither knew what to talk about. It seemed they were drifting further apart. Then one weekend the Dad had a little wood work project to do and needed to go to the hardware shop, but instead of driving, he thought he would cycle since he had started cycling to work and had been enjoying it. As he was leaving he asked his son if he wanted to come, and his son said yes. They rode together to the shop, and as they traveled they talked, and as it took longer to travel by bike they had time for a good conversation. “He really opened up” said the employee. The participant was clearly very excited about it and felt that the act of sharing time in this way had not only benefited his health and sense of well being, but had also positively impacted on this important relationship.
Example 2: A woman from workplace Bg intervention had been approached by a volunteer to see if she was interested in considering an alternative transport to the SOV. The woman replied that she had thought about using the bus for years since there was a bus stop on her front lawn, but she had never really gotten around to finding out where that bus went and how long it took, and assumed it would just be quicker and easier to drive. The volunteer offered her a free one day multi-rider to try out the bus and offered to find her the information relevant to her journey. The woman lived about 20km south of Perth, and it turned out that the bus that left from the front of her house was an express route to the city, and with the bus lane it reduced her trip time from between 25 and 40 minutes in peak time to only 15 minutes, and the bus stopped directly in front of her place of work. The woman reported that she could not believe she had been driving every day for 15 years when the bus saved her so much money (fuel, parking, maintenance of car), and time, and she was so much more relaxed now she was not stuck in peak hour traffic twice a day.
10.3 Summary of Chapter

The main findings presented in this chapter can be summarised as follows:

- The main motivator for mode choice, both SOV and alternatives, is convenience;
- For SOV users, following convenience travel time and ‘other’ reasons are the most common motivators;
- For users of alternatives to the SOV, following convenience, exercise and cost are the most common motivators;
- Significant external barriers can prevent behaviour change from taking place even when internal barriers are addressed. Particularly important barriers include parental duties, work responsibilities, poor end of trip facilities, cost and safety or security issues;
- Internal barriers which remained a problem in a proportion of the sample included the preference for convenience of car travel, and the perception of government responsibility for transport behaviour;
- An additional finding was the influence of story telling or sharing or personal experience as an effective tool for achieving participant engagement with the issue.
In this chapter the results reported in chapters 8, 9 and 10, are discussed in relation to the research questions, together with issues arising from those findings. The concepts and findings of the research are placed into the broader context of educational theory, environmental education, travel demand management and policy development, allowing speculation on the implications and possible application of the research in these areas in addition to future directions.

This research aimed to determine the most effective educational strategy to use in a workplace situation in order to achieve a shift in transport mode away from the single occupant vehicle. The primary goal of the three educational interventions was to achieve an increased awareness, development of positive attitudes and increased empowerment regarding sustainable transport choices. Based on a combination of environmental education and self-regulation of learning theory, it was theorised that achieving the three aforementioned educational outcomes would be highly likely to result in a change in behaviour.

In the first intervention, which provided information only, knowledge was increased but no other variables of interest were influenced significantly (table 8.10.1). This supports the theory that increasing knowledge alone is unlikely to achieve a change in attitude, empowerment or behaviour. The model adapted from Radloff (1997) presented in chapter 1 (figure 1.2.2) suggests that in order to achieve active learning engagement in the participant an opportunity to set goals, plan, monitor and evaluate...
achievement of the goals must be provided in addition to the development of knowledge and positive attitudes, as adult learners are not necessarily self-regulated learners (Radloff, 1997). This finding is supported by findings of other research which failed to achieve a target behaviour through provision of information alone (Costanzo et al., 1986; Finger, 1994; Larson & Massetti-Miller, 1984; Midd n et al., 1983; Nisbett et al., 1976; Staats, Wit, & Midden, 1996). Costanzo et al. (1986) points out that: "Although advertising is an important tool for creating awareness, it is wasteful to invest most of our efforts in an influence strategy that has such a low probability of success." (Costanzo et al., 1986).

The second intervention, which provided opportunities for participants/learners to engage in discussion and to some extent assistance in planning for personal behaviour change, achieved the greatest overall change with statistically significant increases in knowledge and attitude, as well as a significant reduction in single occupant vehicle (SOV) trips (table 8.10.1). Interestingly, a change in behaviour was achieved without a significant improvement in the level of self-efficacy which was used as an indicator of empowerment. The type C program also achieved a significant increase in knowledge and attitude without a change in efficacy, but the type C group did not achieve a significant trip reduction (table 8.10.1). It is interesting to reflect on what could have caused this difference given that both groups received the same information, although slightly less frequently in the type C group.

While knowledge was significantly increased over time in all three intervention groups, and no difference in change was observed across interventions or workplace
type, it is notable that in the type B intervention where knowledge was initially the lowest, the greatest increase was observed (figure 8.1.2). It is possible that as the behaviour was changed, the participants sought to further increase their knowledge of the issues. This would be true of self-regulated learners, as indicated in the adapted model presented in Chapter 1 (figure 1.2.2). Therefore while all interventions significantly increased knowledge, the difference lies in the influence the new knowledge had on the individuals, whether it was used, and if it was seen as important information.

A notable and unexpected result was the significant decrease in reported general environmental behaviours. This decrease occurred in all intervention groups as well as across all workplaces and other demographic variable groups (section 8.5). A possible explanation for this (rather than actual decrease in such behaviours) is the potential for significantly improved knowledge and self-awareness to improve the accuracy of reported actual behaviour. Surveys have been shown to have an intervention effect on the awareness of individuals by drawing their attention to their own actual behaviour (Babbie, 1990). In this way it is possible that the process of asking about environmental behaviour at the beginning of the intervention resulted in greater attention being drawn to those behaviours and a more accurate report of them at the conclusion of the interventions.

The results show no significant change in the mean self-efficacy for any of the three intervention groups (figure 8.4.2). One reason for the lack of measurable change in empowerment across the sample, even in the group that achieved a behaviour change, may be the perception of the external barriers as presented in chapter 10. A
large proportion of the sample commented that they were not able to use alternatives due to these external barriers such as parental duties, work hours, safety and lack of public transport (section 10.2). If there was no perceived removal of these barriers it makes sense that participants would feel no change in their level of empowerment. A number of participants commented on their surveys that they felt they were more aware of the issues and would prefer to use alternative transport, but these options were not available to them (section 10.2). This is indicative of the sort of disempowerment the education programs were trying to overcome.

Marshall (1996) reported that only 26% of Perth’s population face no major barriers to using alternative transport. If this is true, then it is unsurprising that no change in empowerment occurred. For participants to feel that alternative transport was an option to them they would need to see that the barriers to the target behaviour had been removed, or participate in removing the barriers themselves (Coleman & Curtis, 1997; Curtis & James, 1998). In this case more effort is needed to address the large-scale barriers that were beyond the scope of these education programs. The results of this research found a number of external barriers factors were expected by participants. Physical barriers such as lack of infrastructure, services and poor end of trip facilities significantly impacted on participants’ ability to alter transport behaviour (section 10.2). Sociopolitical barriers such as conflicting government messages relating to road use and public transport pricing impacted participant beliefs about the need to reduce SOV use (section 10.2).

Demographic factors which significantly influenced person variables (knowledge, attitude, behaviour, self-efficacy) also provide some clues to the impact of some
barriers. One demographic factor which influenced attitude to car use and air quality was the participants type of job (figure 8.2.5). Interestingly, employees in managerial or professional roles were likely to have significantly lower attitudes for car use and air quality, which did not increase over the intervention period, than the clerical/administrative group which significantly increased over the intervention period (section 8.2). The technical/fieldwork sample also increased attitude 1 over the intervention. Furthermore, as with the target attitudes (attitude 1) the general environmental attitudes of managers and professionals were significantly lower than the other two groups of employees both pre and post intervention. Clerical/administrative employees reported the most positive general environmental attitudes (figure 8.3.3). As it is generally the managers and professionals of an organisation who are responsible for decision making processes these results have implications for the development of sustainable transport policy, both within organisations and in general.

The other significant demographic factor was sex, which had an interesting pattern of influence on the dependent variables of knowledge, attitude and SOV trips. While the male sample had significantly higher knowledge on both occasions (figure 8.1.4), the female sample had significantly more positive environmental attitudes on both occasions (figure 8.3.2). Despite more positive attitudes, females reported a significantly higher use of the SOV for commuting both pre and post intervention (figure 8.6.6). Furthermore, the female sample did not reduce SOV trips over the intervention period, while the male sample reported a significant reduction in SOV use. It is possible that females are less able to address the issues of car dependency due to parenting or family responsibilities (Nicholson, 1997; VandenHeuvel, 1995),
and therefore feel the information regarding the issues is less relevant to them than to their male counterparts. This could explain the difference in the second survey knowledge scores (table 8.1.5) after both male and female employees had had an equal opportunity to learn. The higher rate of SOV use and the lack of significant change in the female sample as opposed to the male sample (figure 8.6.6) suggests there is definitely some factor influencing female transport choice which does not operate on the male sample. This factor could be the parenting duties, which were reported as a barrier primarily by female participants (section 10.2). Safety concerns may also be a more significant barrier for female employees, although this cannot be confirmed from the available results. The results suggest that even if attitude and knowledge are modified, external barriers such as these can increase the level of difficulty of the behaviour and strongly influence the potential for change.

External factors not only influence the ability to change behaviour, but also may reduce the likelihood of the behaviour being maintained. In chapter 8 the breakdown of the sample into the three groups of change (reduced SOV trips, no change, increased SOV trips) clearly indicates that there is a large proportion of alternative transport users returning to the SOV for commute trips. If the ‘greener’ alternative modes of transport were “more convenient, cost effective and less stressful” as described by Transport (1999c) then why is this proportion of participants changing back to the car? It is likely that this negative change is the result of either: 1) a negative experience such as feeling threatened, or difficulty with the journey either physically or due to service provision issues; 2) individuals feeling their contribution is not valued so ‘why bother’; or 3) their circumstances change and external barriers such as distance and infrastructure limit their transport choices. It is possible that the
education programs could achieve some prevention of people returning to SOV use through the value placed on the contribution of alternative transport users, and empowering individuals to address external barriers. Although this was not formally considered in this study, it is clear that not only is changing individuals behaviour important, but also maintaining the behaviour of those already engaging in sustainable transport practices. It also raises the question of how appropriate it is to invest in behaviour change without addressing the issues that may undermine the target behaviour.

On the other hand, if all the barriers were magically removed, without education it is likely that there would be no change of behaviour as individuals would be unaware of the changes, and even if they were aware, the internal barriers may still prevent individual behaviour change (Coleman & Curtis, 1997; Curtis & James, 1998). The results indicate that the two most involving programs have been successful in increasing the target attitudes (figure 8.2.2), and therefore the participants are more amenable to changes in the alternative transport situation. However, without overcoming the external barriers the removal of internal barriers is likely to have little influence on actual behaviour even in a self-regulated learner.

While there was no measurable improvement in levels of empowerment within workplaces (table 8.4.3), there was a definite observed increase in empowerment in some workplaces where employees worked together to lobby for services, and worked together within their organisation to achieve changes to policy, but even this would affect only a handful of participants. It may have been more appropriate to assess in detail the group of individuals who were participating in the green transport
planning process, as there was a definite observed increase in the level of empowerment as demonstrated by increased level of participation in lobbying both local government and workplace management for improvements to alternative transport facilities. This was even reported by the participants themselves. For example:

“Positive feedback was received and … improving facilities for cyclists etc. So people felt the program empowered them to some extent..” (580.7) and “It empowers people who participate in it because … if one person in this department changes their habits that’s good but its not really going to make a huge difference, but collectively, a group, if everyone does a little bit, and I think the way this was promoted where you are not saying to a person ’don’t drive your car ever again’ I think that was a good approach and I think a lot more acceptable than if you were trying to, not outlaw, but you know, force on people…” (FPW11:637).

While studies that have used ‘individualised marketing’ have found that a significant reduction in SOV use can be achieved by using travel behaviour information to inform decisions and identify opportunities for behaviour change (James, 2000), it is unknown whether these programs achieve a measured change in the psychological construct of empowerment. It is certainly true that a behaviour change is achieved by these programs and the behaviour change may have been used as an indicator of increased empowerment. Does this therefore mean that by providing information specific to an individual it is possible to engage participants in a process of learning which leads to a self-regulated response? In the type B program it is possible that the support provided by the volunteer enabled participants to gather their own ‘individually specific’ information and therefore such support overcomes the internal
barriers to their SOV dependency. By encouraging a personal process of goal setting, evaluation and planning through a role model a behaviour change was achieved.

The significant 10% reduction in SOV trips in the type B intervention group (table 8.6.2), a mean of 1 trip less per person per week, was achieved without the more labour intensive process of individualised feedback. Individualised attention was given by the workplace volunteer to participants who requested this service, but the majority of participants did not require detailed feedback on their own behaviour. The most requested service from the volunteer was answers to specific questions and the sourcing of information such as cycle maps and timetables with route maps. This seems strange as this information is available through the internet and is attainable by visiting information distribution points or phoning the information lines, suggesting barriers may exist in terms of knowledge of where to look for such information, or the time required to gather information. However, the evidence (section 8.8 and 8.9) suggests that the motivation to act was gained through the enthusiasm and encouragement of the volunteer or role model and the provision of information overruling the perception of some of the barriers to the target behaviour.

The same result was not achieved in the type C intervention which increased knowledge and attitude but did not result in a change in participant transport behaviour. It is possible this is due to the slightly altered role of the volunteer who had less time to develop relationships with the employees. Yet while no behaviour change was achieved at an individual level, a major change in organisational behaviour was observed (table 9.3.1). In addition, the type C program had the
greatest qualitative impact on individuals, though this was not supported by the quantitative data on behaviour change. This can be interpreted as follows. By encouraging the participants to own the process of discovering the impacts of the car and the benefits of the environment a greater level of intrinsic motivation was achieved and the result was that the employees were more likely to become a self driven group which endeavoured to continue working on reducing car use in their workplace (section 8.8).

The changed organisational characteristics and outlook regarding single occupant vehicle dependency is very positive. The range of comments from type B participants relating to problems at the organizational level highlighted the importance of a holistic approach to the process of achieving transport behaviour change (section 8.8). If the organisational change was achieved in the type B programs also it may have resulted in even greater trip reduction.

The major drawback in the type C intervention was probably the small proportion of employees who were actually involved in the process. While the individuals who were directly involved exhibited increased empowerment, this did not necessarily flow through to the rest of the workplace. Ideally, the design of the interventions would suggest that what occurred in the type B intervention should also occur in the type C intervention as the strategies were cumulative, as explained in chapter 5 (table 5.4.1). This plan was flawed however, because as soon as the green transport planning process was implemented and the ownership of the program and general events was given to the workplace committee, the nature and delivery of the program was changed. The volunteers time in the type B program was devoted solely to
spending time with employees to share information and help plan changed
behaviour, whereas in the type C program the volunteers spent more time assisting
the green transport group with tasks associated with the green transport plan. In
addition, several type C workplaces took the view that the education component of
the program should be delayed until the green transport plan had been completed.
This meant that the intensity of the education program was lessened in the type C
workplaces because the focus of the workplace was on the development of the green
transport plan. The overall consequence of these directions was a reduction in the
useful interaction and feedback from the volunteer to the participants.

Another point of consideration is that the process of developing a green transport
plan at the organisational level before achieving the employee behaviour change,
may have had a negative influence on levels of empowerment and the motivation to
change. It is possible that in a similar way to the participants transferring the
responsibility for transport change to the government (table 10.2.2), the process of
making organisational changes may have lead to a certain amount of apathy and
redirected responsibility. The additional focus on employer responsibility may have
resulted in participants believing that they did not have to do anything until the
workplace had made certain changes. As with any change it is common for people to
think that ‘it will be easier when...’ certain circumstances change. This may be true
in many cases, but change from any sort of entrenched or habitual behaviour is
difficult and requires personal engagement with the process of addressing barriers
and overcoming those barriers (McKenzie-Mohr & Smith, 1999; Merriam &
Caffarella, 1991). The most difficult barrier to address may still be the internal
resistance to giving up car dependency.
On the other hand, the achievement of change at the organisational level may be the firm foundation required for achieving sustained change in the future. Employees in workplaces which did not engage in a green transport planning process reported the need for ‘management to be involved’ or to ‘address employers policy’ as presented in chapter 10 (section 10.2). The type C intervention workplaces implemented and considered a greater number of changes within the organisation as a result of the green transport planning process (table 9.3.1). This suggests the greater involvement and ownership of the program by type C workplaces led to a greater overall impact on the organisation itself.

While the type C intervention clearly did not achieve significant trip reduction over the intervention period, there is an argument for indications of delayed trip reduction – ie, the duration of the survey period was not long enough to capture the behaviour change when it happened because the green transport planning process meant the intervention took a longer period of time, although the survey was still completed at the 9 month period. It is highly probable that if the transport behaviour change achieved by the type B intervention (table 8.6.2) was supported by the organisational changes achieved by the type C intervention the target behaviour would be more supported, and if the alternative transport ethic became a part of the normal functioning of the organisation it would be passed on to new employees through induction, policy, and social norms of the dominant workplace culture.

The results suggest that workplace characteristics, both cultural and physical, influenced intervention success (section 9.1). Qualitative evidence indicates the
cultural characteristics of each workplace influenced the interventions at every stage (section 9.2). If a workplace liaison was not supportive of the program then it was not as effective as in a workplace where the liaison was enthusiastic and supportive. If a workplace management was not 100% behind the program then the program was not as effective as in others where management was openly supportive and encouraging. If a workplace was already committed to a strong health safety and environment policy then the intervention was more easily implemented and more readily accepted. The physical characteristics of the workplace also influenced the success of interventions. The physical environment or workplace structure strongly influenced the effectiveness of the volunteer in the type B program: for example, if the workplace was difficult to move around and communication with workers was thereby hampered, then the volunteers found it difficult to effectively communicate the message across the whole workplace and a greater proportion of participants tended to report the volunteer as ‘unhelpful’ because they may not have experienced their support (figure 8.9.5, sections 9.2 and 10.2). Communication norms strongly influenced the effectiveness of information distribution and awareness of the program. If a workplace was spread out and had a large number of entrances then the employees did not all benefit from the information display, and often did not know of events and seminars happening (table 8.9.1, sections 9.2 & 10.2). This was compounded in workplaces where there was no bulk email facility.

There were also differences in some of the measured variables, with some differences between specific workplaces and other differences between the groups of workplace type. A notable result was that the government workplaces as a group had higher single occupant vehicle trips than engineering workplaces (figure 8.6.3).
Workplaces reported very different mean trips and trip reduction. For example, Ae and Cg did not change SOV trips over the intervention period, while Bg reduced trips significantly (table 8.6.6). A relationship existed between attitude 1 (attitude to car use and air quality) and workplace type, with government workplaces having the least positive attitude 1 at the beginning of the interventions but the most positive attitude 1 at the conclusion of the interventions (figure 8.2.4). A much greater increase in attitude was observed for the government workplace sample than the engineering workplace sample, so while government had far lower pre-intervention attitudes to car use and air quality, it seems the government workforce were more amenable to attitude change. The attitudes of some workplaces were influenced by the interventions while others were not. Workplace Ce and Ae were not positively influenced, while Bg and Cg showed a significant increase in attitude 1 over time (table 8.2.3). It is worth noting however, that while workplace Ce did not change, the mean pre-intervention location of attitude 1 for this workplace was more positive than all the other workplaces, and closer to the post intervention location of other workplaces’ attitude 1 (figure 8.2.3). It is possible then that the program may have been unable to increase the already highly positive attitudes of this workplace. It is also possible that the pre existing positive attitudes of this workplace may have made a major contribution to the success of workplace strategies despite not achieving significant trip reduction.

Gordon (1991) argues that organisational culture is strongly influenced by the characteristics of the industry in which the organisation operates and that organisations within an industry share certain cultural elements. This seemed to be true for many of the observed cultural characteristics, with an often clear difference
in location between the government and engineering type workplaces on the Robbins (1994) characteristics. Organisational culture influenced the success of programs from the earliest stage of implementation, through to the final stages. Generally, organisations that had a strong environmental values system and which encouraged employees to act on these values were more supportive of the programs across all intervention groups (sections 9.1 and 9.2).

There seemed to be a difference between workplaces with a strong culture and those with a weak culture. In cases where there was a strong organisational culture the program was more readily accepted and the volunteers seemed to find it easier to engage with employees. This has implications for workplace selection. If organisations with particular cultural characteristics are more likely to be positively influenced by environmental education programs then it is sensible to target these organisations first. In addition, it is appropriate to incorporate strategies for corporate environmental education which can target the particular needs of certain groups of organisations. For example, a program which engages employees in problem solving, and provides the opportunity to make positive changes to organisational policy and practice is more likely to be successful in engineering organisations with a positive environmental policy than in a government organisation where the dynamics of hierarchy create a different educational environment.

A number of workplace factors particularly influenced transport behaviour. Involvement of management, human resources policy, type of work (eg. office based or other), and the support for environmental transport choice through provision of end of trip facilities were particularly important (section 10.2). These factors tie in
with the external barriers discussed earlier, whereas the workplace barriers were able
to be addressed within the scope of the interventions. The main reason for
examining the workplace factors was to determine if there were any specific
explanations for either achieving or not achieving behaviour change in the
workplace. It seemed the main reason transport change did not occur was that an
insufficient level of change in attitude and workplace culture was achieved.
Although this was the main reason, there seemed to be a range of different factors in
each workplace that contributed to a lack of/achievement of behaviour change. For
example, in workplace Cg the adoption of the plan was successful, but the time
required to present, approve and implement the plan was significant. This workplace
would have benefited from additional external support post intervention, and a
schedule of deadlines to meet, which could be worked towards and then seen as
achievements rather than the more relaxed approach which took place, leading to a
significant delay in the approval and implementation of actions within the green
transport plan. In contrast, workplace Bg had a small group of employees
determined to change the behaviour of the organisation who provided significant
time and expertise throughout the intervention for such activities as developing a
TravelSmart workplace message system on the office intranet.

In summary, the type A information only program significantly increased knowledge
as did the Type B and C programs. Knowledge (information and data processing) is
considered important in environmental education as awareness of the issues and
potential solutions is a first step in moving towards achieving change (Sia,
Hungerford, & Tomera, 1986; Staats et al., 1996), but the results of this research
support the idea that knowledge alone is not effective in achieving behaviour change
The Type B leadership intervention achieved a significant increase in knowledge and attitude and also achieved a significant reduction in SOV trips (table 8.10.1). The Type C (most involving) intervention had the greatest long term impact on participants through organisational change (table 9.3.1), and therefore by extrapolation would be likely to have the greatest impact on society. The third intervention achieved significant change in knowledge, and attitude and organisational practices. While a smaller trip reduction was achieved with the Type C program than for the Type B intervention, it is considered that the intervention was not complete at the time of survey, and thus the full effects may be evident after a longer period of time. It was not possible to follow up the type C intervention groups due to restrictions on time and resources.

Evaluation of success and effectiveness is therefore complicated. From the quantitative participant perspective it is clear that the type B program is by far the most effective as it achieved the primary goal of trip reduction. However, it is unknown if the trip reduction can be sustained, as there is strong evidence that external factors contribute to transport behaviour returning to SOV use (sections 8.7 and 10.2). While it is possible to alter human behaviour in a workplace environment through education, with a greater understanding of the array of external barriers in place, it may not be sensible to view the success in this field as the solution to car dependency in Perth. One particularly clear message is that while a large percentage of individuals changed their behaviour positively over the 9 month period, an equally large group of participants who were originally travelling using greener methods increased their use of the single occupant vehicle (table 8.7.1). With this in mind and the evidence of greater organisational change towards more sustainable transport in
the type C program it could be argued that the green transport planning program
could be in fact the more effective of the three. The optimum result would of course
be the trip reduction evidenced in the type B intervention being achieved in
conjunction with the development of organisational support for maintenance of green
transport use.

In the broader context of air quality management and transport planning, approaches
which are quick working with easily marketable results such as those produced in the
type B program are generally considered politically expedient. Yet there is
significant risk that the successful achievement of short term behaviour change
would result in a need for repetition in order to maintain the achieved level of
behaviour change. Educational theory, particularly in relation to self-regulation of
learning in adults, suggests that the more slowly achieved but more deeply involving
process of self-regulated learning is likely to achieve a longer-term change. If the
longer term change is desired then longitudinal projects requiring collaboration
across community, workplace and government departments is necessary.

Unfortunately, issues such as SOV dependency are often not effectively addressed
because there is no single easily implemented solution – ie, ‘do this and it will all be
fixed’. The more complex solution that is required means the task falls across a
number of decision making categories. As a result it requires a cooperative approach
from government (within and between), industry and community. As Whitelegg
(1997, p200) points out:

“There is no shortage of possible solutions to transport problems. Most parts of the
world have an example of a strategy or policy that has been implemented to reduce
the volume of traffic in urban areas, provide high quality alternatives to the car, improve air quality and make different arrangements for the movement of freight… However, a lot of mindless planning and road building still occurs, almost blind to the developments of the last 10 years.”

Trying to reduce the use of SOV means trying to make a car dependent culture reduce its addiction to the motor vehicle. That is why approaches which include empowerment and social values education are such an important component of such change. Education alone cannot overcome the entire problem, but without it other strategies will not be as effective. As Berberet (1990) states, “The real behavioural and social changes that environmental education aims for can only occur if all of society at all educational levels becomes involved”. Developing a new social culture, one which does not unquestioningly value the car, and has a greater understanding of the consequences of its use, requires deep learning - deep change.

Yet as Whitelegg (1997) points out, large scale change in social practices that requires long term goal setting and new kinds of investments and political priorities has been achieved before: “The changes that took place in Europe to introduce sanitation and fresh water into cities, abolish child labour and establish social and healthcare provision for all were equally demanding and very successful.” (Whitelegg, 1997,p206). It would be interesting to see what the role of education in these situations was, and how success related to individual engagement in the process of learning (eg motivation, orchestration etc). In the case of the transport behaviour of commuters examined in this research the situation can be summarised as follows:
a) External changes are needed (infrastructure and external barrier removal in organisations and wider society influences transport behaviour); 
b) Organisational change is needed (the use of educational strategies type B or C, tailored to the particular needs and characteristics of an organisation, provides the foundation for long term behaviour change); and 
c) If the changes in a and b (above) are achieved, then it becomes easier to achieve internal change as improvements in knowledge, attitude and empowerment are less constrained.

It is important to note that despite change in external factors and organisational factors some individuals are always likely to be constrained unless huge social change is achieved. For example the concerns about safety that appear to have grown more serious in recent years (section 10.2), as highlighted by a focus group participant: “It’s not as safe a society as even when I was at school and I’m not that old! And I really worry…” (SBW7:16).

The social change required to overcome these problems within society has been linked to the loss of village style living (Steer Davies Gleave, 2000), and it has been suggested that issues relating to planning, understanding of transportation problems and social values have significantly contributed to the growth of automobile dependence (Newman et al., 1992), as outlined in chapter 2.2.

A holistic approach to transport demand management is required. Behaviourally focused travel demand management is not more important than other approaches, but of equal value and importance. While the behavioural approach is essential and effective, it is not more important than other measures currently being used to reduce SOV dependency (as outlined in chapter 2). Behavioural approaches are equally
important and for optimum success a balanced combination of measures should be used including policy, infrastructure development, and education. When education is employed to achieve behavioural change it is important for the education provider to be aware of the processes of learning which underlie behaviour change in order that the most effective educational strategy may be applied. In the case of adult education in a workplace situation, assumptions about adults as self-regulated learners (Radloff, 1997) should be challenged in order to avoid investing in educational interventions (such as the information only type A intervention) which in isolation do not achieve behaviour change.

**Conclusion**

This research aimed to determine if workplace based interventions which stimulate a deeper level of learning, and encourage self-regulated learning and reflective practice are more likely to achieve positive behaviour change than interventions based on more superficial learning. The results of the research showed that on an individual level, knowledge, attitude and behaviour were influenced in the two more involving interventions, showing that while information alone can increase knowledge it does not result in an attitudinal or behavioural change. The second intervention achieved the greatest reduction in single occupant vehicle trips, but it is unknown if this behaviour change can be sustained. At an organisational level the third (most involving) intervention resulted in the greatest organisational change, and it is likely that the measures implemented as a result of the green transport planning process will have an ongoing impact on employee transport behaviour in the participant workplaces.
The perception of effectiveness of these three strategies is dependent on the chosen measure for success. If value is placed on quantitative evaluation and measurement of short term trip reduction the second program would be considered more effective. If however, value is placed on the longer term influence of human learning for behaviour change then a need exists to recognise the importance of workplaces achieving the qualitatively measured goals of a green transport plan. The outcomes are longer lasting and continuous in effect even after intervention withdrawal from the workplace.

A secondary aim of the research was to determine if the characteristics or type of workplace influence the effectiveness of particular education strategies. The results indicate that the success of each intervention type varied between workplaces. Structural factors such as design of the work environment, internal mail and email systems, and work hours influenced the delivery of the interventions in some workplaces and qualitative data indicates this may have influenced success. Qualitative data also indicates that management involvement and workplace culture were major factors influencing participant perceptions of effectiveness of particular education strategies.

Overall the research concludes that while the second intervention involving leadership (but without participant ownership) achieved the greatest reduction in use of the single occupant vehicle, the third intervention achieved the greatest long term impact on participants and organisations. These findings have implications for the way in which achieving sustainable transport in metropolitan areas is approached, as well as other environmentally sustainable behaviours. This includes: a need for
consideration of the longevity of process required when setting goals; an awareness of the difference between long term impacts and short term impacts; a consideration of holistic approaches to achieving change as opposed to a single approach focused on a single outcome; and recognition of the importance of educational theory in the application of environmental education to the problem of motor vehicle dependency.
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Department of Environmental Protection. (1997). Air Pollution and You (pp. 56): Government of Western Australia.


Pope, E. (1982). PG&E's loans aimed at poor miss the mark. San Jose Mercury, p. 6B.


Toyne, P., (chairperson),. (1993). *Environmental REsponsibility: An agenda for further and higher education - A report of a committee on environmental education in further and higher education appointed by the Department For Education the Welsh Office*. London: HMSO.


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Appendix I

Detailed table of Travel Demand Management Programs
### 1-2-3 Campaign Against Global Warming

<table>
<thead>
<tr>
<th>Country</th>
<th>USA</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Objective</strong>:</td>
<td>to inform people about the dangers of global warming and spur them into action to do something about it.</td>
</tr>
<tr>
<td>Commissioning body</td>
<td>Private</td>
</tr>
<tr>
<td>Funds</td>
<td>No</td>
</tr>
<tr>
<td>Time Frame</td>
<td>&lt;1 year</td>
</tr>
<tr>
<td>Area</td>
<td>Community</td>
</tr>
<tr>
<td>Approach</td>
<td>Leadership/social diffusion</td>
</tr>
<tr>
<td>Evaluated</td>
<td>Yes</td>
</tr>
<tr>
<td>Success</td>
<td>Yes</td>
</tr>
</tbody>
</table>

**Details**: The 1-2-3 Global Warming Campaign was initiated in the 1st Unitarian Church in Portland, Oregon in January 2001 to inform people about the dangers of global warming and spur them into action to do something about it. Congregants were asked to 1) reduce their household thermostats by 1 degree in the heating season; 2) reduce their driving speeds by 2 miles per hour from the speed they'd normally drive when traveling 60 m.p.h. or more; and 3) replace 3 regular light bulbs used extensively at home with compact fluorescents. These three actions would reduce carbon dioxide generation by 1,300 pounds per year and save the average household about $90 (U.S.) annually. Participants, who signed pledge forms, had the flexibility to take any or all of the three actions. The Campaign featured a Kickoff program, mailing to all households, public support from the ministers, and weekly compact fluorescent light bulb demonstrations and church bulletin updates.

**Results**: In all, 412 households pledged, reducing annual CO2 generation by approximately 580,000 pounds. To gauge results, a professional pollster helped design a survey/evaluation form, which 46% of the participants filled out. Ninety-eight per cent of the households fulfilled all (55%) or some (43%) of their pledges. Ninety-five per cent planned to continue their actions. Even more promising, 63% took additional actions against global warming on their own, specifically citing what they had done. Finally, 60% told others about the program, with 16% telling four or more people. The 1-2-3 Program is now being considered by other Unitarian churches and denominations. There is also a possibility it may be piloted in workplaces (without religious references). It is easily adaptable and a complete how-to packet is available to anyone.

### ADONIS

<table>
<thead>
<tr>
<th>Country</th>
<th>Europe</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Objective</strong>:</td>
<td>The overall objectives of ADONIS (Analysis and Development Of New Insight into Substitution of short car trips by cycling and walking) were: to present a catalogue of best practices for promoting cycling and walking, to compare and contrast cycle/pedestrian-minded and non-minded cities, to provide new knowledge regarding behavioural factors affecting modal choice for shorter trips in urban traffic, to increase cyclist and pedestrian safety through the identification of important human factors which may contribute to traffic accidents and to provide a comprehensive overview with general recommendations and guidelines to promote walking and cycling for urban decision makers within the European Union.</td>
</tr>
<tr>
<td>Commissioning body</td>
<td></td>
</tr>
<tr>
<td>Funds</td>
<td>Yes</td>
</tr>
<tr>
<td>Time Frame</td>
<td>1.5 years</td>
</tr>
<tr>
<td>Area</td>
<td>Non-specific</td>
</tr>
<tr>
<td>Approach:</td>
<td>Information</td>
</tr>
<tr>
<td>Evaluated</td>
<td>Unknown</td>
</tr>
<tr>
<td>Success</td>
<td>Unknown</td>
</tr>
</tbody>
</table>
## Arizona Ordinance

<table>
<thead>
<tr>
<th>Country</th>
<th>USA</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Objective:</strong></td>
<td>Attempts to achieve 15%, 20% and 25% reductions in vehicle miles traveled and increase their Alternate Mode Users (AMU) over 3 years.</td>
</tr>
<tr>
<td>Commissioning body</td>
<td>Government</td>
</tr>
<tr>
<td>Funds</td>
<td>Yes</td>
</tr>
<tr>
<td>Time Frame</td>
<td>3 years</td>
</tr>
<tr>
<td>Area</td>
<td>Workplace</td>
</tr>
<tr>
<td><strong>Details:</strong></td>
<td>63 organizations were studied. A survey was conducted in 1989 to be used as a base line for the study program. Organizations used different approaches but the top methods found to be successful in increasing AMU and reducing vehicle miles travelled were; providing information to new employees, alternate mode information dissemination, bike racks and locker areas, information centers and newsletter articles. The cost of the plan implementation was an average of $11.85 per person. Types of Incentives Offered: A disincentive used was increased parking costs. Incentives included bike racks, showers, preferential parking for alternate mode users, a ride matching service and telecommuting.</td>
</tr>
<tr>
<td><strong>Approach:</strong></td>
<td>Information</td>
</tr>
<tr>
<td>Evaluated</td>
<td>Yes</td>
</tr>
<tr>
<td>Success</td>
<td>Yes</td>
</tr>
<tr>
<td>Reference</td>
<td>(Modarres, 1993)</td>
</tr>
</tbody>
</table>

### Result:
There was an average improvement of over 29% for increasing alternative mode use and approximately 65% of the organizations met the alternative mode use goal for second year of the program. Criteria for Success/Failure:
- Information/education and direct incentives such as adjusted work hours, information centers and special benefits have a more positive impact on alternative mode use.
- Generally, the more the employer spent on the employees, the more successful the program.
- Miscellaneous: It was found that some measures that reduced vehicle miles travelled, actually reduced AMU and interrupted carpooling that already existed. An example of this which is only useful for companies with multiple sites was shifting employees between workplaces so that they work closer to their home residence.

### Details:
- 63 organizations were studied. A survey was conducted in 1989 to be used as a base line for the study program.
- Organizations used different approaches but the top methods found to be successful in increasing AMU and reducing vehicle miles travelled were; providing information to new employees, alternate mode information dissemination, bike racks and locker areas, information centers and newsletter articles.
- The cost of the plan implementation was an average of $11.85 per person.
- Types of Incentives Offered: A disincentive used was increased parking costs. Incentives included bike racks, showers, preferential parking for alternate mode users, a ride matching service and telecommuting.

## Boots Commuter

<table>
<thead>
<tr>
<th>Country</th>
<th>UK</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Objective:</strong></td>
<td>To reduce SOV commuting to the Boots Nottingham Headquarters by 10% over 3 years and 10% over the subsequent 5 years.</td>
</tr>
<tr>
<td>Commissioning body</td>
<td>Private</td>
</tr>
<tr>
<td>Funds</td>
<td>Yes</td>
</tr>
<tr>
<td>Time Frame</td>
<td>3 years</td>
</tr>
<tr>
<td>Area</td>
<td>Workplace</td>
</tr>
<tr>
<td><strong>Details:</strong></td>
<td>The scheme was advertised through posters, leaflets and company newsletters. Funding was provided by The Transport 2000 Trust and from the Department of the Environment under the Environmental Action Fund. Boots also spent 250,000 annually on subsidies for its works bus service used by 1,300 of its staff daily. Incentives included; a prize draw for a bike, free taxi home for people who carpool and are left without a ride home and a 5 gift token for people who confirm they share rides.</td>
</tr>
<tr>
<td><strong>Approach:</strong></td>
<td>Incentive</td>
</tr>
<tr>
<td>Evaluated</td>
<td>Yes</td>
</tr>
<tr>
<td>Success</td>
<td>Yes</td>
</tr>
<tr>
<td>Reference</td>
<td>(Davidson, 2001)</td>
</tr>
</tbody>
</table>

### Result:
In the first 6 months, more than 500 of the 6000 employees registered for the program. More than 100 started to carpool. Results indicate a 5 per cent reduction in the proportion of staff driving to work.

## Bus with Us

<table>
<thead>
<tr>
<th>Country</th>
<th>Canada</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Objective:</strong></td>
<td>Address the banks (Seattle’s First National Bank. (Seafirst)) social responsibilities in the areas of energy consumption and traffic congestion.</td>
</tr>
<tr>
<td>Commissioning body</td>
<td>Private</td>
</tr>
<tr>
<td>Funds</td>
<td>Yes</td>
</tr>
<tr>
<td>Time Frame</td>
<td>22+ years</td>
</tr>
<tr>
<td>Area</td>
<td>Business District</td>
</tr>
<tr>
<td><strong>Details:</strong></td>
<td>Seafirst bought bus passes and offered them to all employees free of charge. Seafirst funded all costs. First Year cost $500,000 (average of $170 per employee). Eliminated over 12 million employee driven miles annually and attracted 3,000 of the 7,500 employees. Seafirst had to negotiate bus agreements with eleven transit districts in order to allow its employees to travel free. This allowed Seafirst to forego building expensive new parking sites for its employees.</td>
</tr>
<tr>
<td><strong>Approach:</strong></td>
<td>Incentive</td>
</tr>
<tr>
<td>Evaluated</td>
<td>Yes</td>
</tr>
<tr>
<td>Success</td>
<td>Yes</td>
</tr>
<tr>
<td>Reference</td>
<td>(Debats, 1981)</td>
</tr>
</tbody>
</table>
### Business TravelWise

<table>
<thead>
<tr>
<th>Country</th>
<th>England</th>
<th><strong>Objective:</strong> To reduce from 70% in 1991, to 60% in 2011, the number of residents travelling by car to work, double to 7% by 2011, the number of people travelling to work by bike, and increase from 9% in 1991 to 15% in 2011 the number of people travelling to work by public transport. The program also aims to reduce business mileage by 10% by 1999 and another 10% by 2000.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commissioning body</td>
<td>Government</td>
<td></td>
</tr>
<tr>
<td>Funds</td>
<td>Yes</td>
<td>Details: Provides a package for businesses providing information on cycling, telecommuting, walking, public transport, car sharing and flexi-working hours. Other methods of communication include, letters, leaflets, meetings/workshops, promotional events, exhibitions, cycle friendly employer grants and cycle audit packs. Season ticket loans, substantial savings on annual season ticket offer over daily tickets and the running of a connecting bus to transport interchange in the mornings and afternoons.</td>
</tr>
<tr>
<td>Time Frame</td>
<td>20 years</td>
<td>Result: 25% of businesses produced a transport plan.</td>
</tr>
<tr>
<td>Area</td>
<td>Workplace</td>
<td>(Hertfordshire County Council, 1994) (Hertfordshire County Council, 1998)</td>
</tr>
<tr>
<td>Evaluated</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Success</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Reference</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### CAPTURE

<table>
<thead>
<tr>
<th>Country</th>
<th>Europe</th>
<th><strong>Objective:</strong> To assess and recommend policy instruments and strategies using physical measures designed to encourage travellers to use public transport, cycling and walking as opposed to private motoring in European Union urban areas in order to better meet European policy goals (transport, economy, social cohesion, environment and energy).</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commissioning body</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>Funds</td>
<td>Yes</td>
<td>Details: CAPTURE provides information to urban transport decision makers in Europe on the most appropriate transport strategies to adopt, using physical measures to achieve their local policy objectives.</td>
</tr>
<tr>
<td>Time Frame</td>
<td>3 years</td>
<td></td>
</tr>
<tr>
<td>Area</td>
<td>Non specific</td>
<td></td>
</tr>
<tr>
<td>Approach</td>
<td>Information</td>
<td></td>
</tr>
<tr>
<td>Evaluated</td>
<td>Unknown</td>
<td></td>
</tr>
<tr>
<td>Success</td>
<td>Unknown</td>
<td></td>
</tr>
<tr>
<td>Reference</td>
<td>(CORDIS, 2000)</td>
<td></td>
</tr>
</tbody>
</table>

### Commute A Van

<table>
<thead>
<tr>
<th>Country</th>
<th>USA</th>
<th><strong>Objective:</strong> Promote vanpooling to reduce the need for additional employee parking and new access roads</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commissioning body</td>
<td>Private</td>
<td><strong>Detail:</strong> Employer buys vans to be used for vanpooling, and charges employees accordingly. Fees can be taken out of their paypacket directly. Funding/Cost: The employer funds program with average passenger fare for vanpooling at $39 a month</td>
</tr>
<tr>
<td>Funds</td>
<td>Yes</td>
<td><strong>Result:</strong> 97% of employees said they would stay with vanpooling permanently. 50% had been in the program for 2 years. 80% said vanpooling was more convenient and cheaper than their former mode of transport. 1,600 out of 11,700 employees vanpool. On average only 10 minutes was added to the average vanpooling commute. Vanpooling has a positive effect in the office, with morale boosted and absenteeism lowered.</td>
</tr>
<tr>
<td>Time Frame</td>
<td>27+ years</td>
<td></td>
</tr>
<tr>
<td>Area</td>
<td>Workplace</td>
<td></td>
</tr>
<tr>
<td>Approach</td>
<td>Incentive</td>
<td></td>
</tr>
<tr>
<td>Evaluated</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Success</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Reference</td>
<td>(Debats, 1981)</td>
<td></td>
</tr>
</tbody>
</table>

### Commuter Computer

<table>
<thead>
<tr>
<th>Country</th>
<th>USA</th>
<th><strong>Objective:</strong> To encourage individual ridesharing and help companies find the ridesharing plan that is best for them.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commissioning body</td>
<td>Government</td>
<td><strong>Details:</strong> When employers show interest, Commuter Computer firstly provides ridesharing questionnaires to access their employee transportation needs. The program can be one or a combination of either: Regional Coordination, In House Carpooling or In House Vanpooling. State and Federal Funding although the program is a non-profit organization and all services are free to both individuals and employers.</td>
</tr>
<tr>
<td>Funds</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Time Frame</td>
<td>26+ years</td>
<td></td>
</tr>
<tr>
<td>Area</td>
<td>Workplace</td>
<td></td>
</tr>
<tr>
<td>Approach</td>
<td>Information</td>
<td></td>
</tr>
<tr>
<td>Evaluated</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Success</td>
<td>Yes</td>
<td>Unknown</td>
</tr>
<tr>
<td>Reference</td>
<td>(Debats, 1981)</td>
<td></td>
</tr>
</tbody>
</table>
## CONOCO Vanpool

<table>
<thead>
<tr>
<th>Country</th>
<th>USA</th>
<th><strong>Objective:</strong> To reduce traffic congestion and reduce money spent on access roads and carparks by promoting vanpooling for its employees.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commissioning body</td>
<td>Private</td>
<td><strong>Detail:</strong> Company purchases several vanpools and encourages employees to rideshare. The vanpool program operates on a break even basis. The company absorbs all administration costs of running the program. The employee fare ranges from $18 to $41 a month. Vanpool drivers ride free, and the 1978 Energy Tax Act offered tax incentives for vanpool sponsoring companies and the participating employees. Vanpool drivers were selected on the basis of driving and work records as well as attitude toward the program. The careful screening process is imperative as the success of the program depends on them. A hindering factor is that work activities and meetings have to be specially scheduled and they inevitably occasionally run overtime. Special straggler vans take employees home that have missed their usual ride. Houston had no public transportation system prior to the program and it was becoming plagued with traffic congestion and parking difficulties. CONOCO decided vanpooling would be the best solution for its employees.</td>
</tr>
<tr>
<td>Funds</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Time Frame (Years)</td>
<td>25+</td>
<td></td>
</tr>
<tr>
<td>Area</td>
<td>Workplace</td>
<td></td>
</tr>
<tr>
<td>Approach:</td>
<td>Incentive &amp; Information</td>
<td></td>
</tr>
<tr>
<td>Evaluated</td>
<td>Yes</td>
<td><strong>Result:</strong> 93% of participants thought vanpooling was equally or more convenient than their previous mode of commuting and 30% plan to sell their car or not to buy another as a result of the program. The program included 40% of the headquarters employees.</td>
</tr>
<tr>
<td>Success</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Reference</td>
<td>(Debats, 1981)</td>
<td></td>
</tr>
</tbody>
</table>

## Cycle 100

<table>
<thead>
<tr>
<th>Country</th>
<th>WA</th>
<th><strong>Objective:</strong> The cycle 100 program sought to create a change in commuting patterns by encouraging new riders to cycle for work trips for at least 2 days per week.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commissioning body</td>
<td>Government</td>
<td><strong>Detail:</strong> A combination of departmental and sponsorship funds enabled the provision of bicycle equipment to 63 riders, all of whom had been regular car drivers for their trips to and from work. Each cyclist had an average target of 145 km per month, for a cumulative total of 8246 kms per month. A series of pre and post measures were developed to evaluate the success of the program.</td>
</tr>
<tr>
<td>Funds</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Time Frame</td>
<td>1 year</td>
<td></td>
</tr>
<tr>
<td>Area</td>
<td>Business District</td>
<td></td>
</tr>
<tr>
<td>Approach:</td>
<td>Incentive</td>
<td></td>
</tr>
<tr>
<td>Evaluated</td>
<td>Yes</td>
<td><strong>Result:</strong> The riders after the first 4 months were averaging 181 kms per month for a cumulative total of 10331 kms, exceeding the target by over 2000kms per month. The riders have covered a total of 41000 kilometres in the first four months of the program. An average sized Australian car travelling 41000km would produce 9.2 tonnes of greenhouse gas emissions.</td>
</tr>
<tr>
<td>Success</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Reference</td>
<td>(Marshall, 1999)</td>
<td></td>
</tr>
</tbody>
</table>
**Cycle Friendly Employers**

<table>
<thead>
<tr>
<th>Country</th>
<th>England</th>
<th>Objective: To encourage employers to facilitate cycling as a mode of transport for commuters in their workplace</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commissioning body</td>
<td>Government</td>
<td>Detail: This web site explains why cycling is to be encouraged and how employers can help with the process. Based on the experiences of the Cycle Friendly Employer's Scheme in Cambridge, it offers advice on facilities for cyclists, and provides case studies of examples of good practice. If you work in Cambridge, your workplace can join the scheme. There are three basic steps involved after joining: 1) appoint a voluntary cycling co-ordinator to represent you at scheme meetings as well as representing the scheme within your workplace. 2) find out how staff get to work at present and what measures might encourage more of them to cycle. 3) draw up and implement a company cycle plan, which sets out targets to increase cycling numbers at your workplace and how to achieve them.</td>
</tr>
<tr>
<td>Funds</td>
<td>Yes</td>
<td>Evaluated</td>
</tr>
<tr>
<td>Time Frame (Years)</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Area</td>
<td>Workplace</td>
<td></td>
</tr>
<tr>
<td>Approach:</td>
<td>Leadership/social diffusion</td>
<td></td>
</tr>
<tr>
<td>Success</td>
<td>Yes</td>
<td></td>
</tr>
</tbody>
</table>

**Cycle to Work**

<table>
<thead>
<tr>
<th>Country</th>
<th>WA</th>
<th>Objective: Aims to encourage employees to consider cycling to work especially those who drive and live within 10km of work. The program also aims to reinforce the travel choice of those who currently cycle to work and show leadership by running a workplace activity to influence travel choice.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commissioning body</td>
<td>Government</td>
<td>Funds</td>
</tr>
<tr>
<td>Time Frame</td>
<td>?</td>
<td></td>
</tr>
<tr>
<td>Area</td>
<td>Business District</td>
<td></td>
</tr>
<tr>
<td>Approach:</td>
<td>Information</td>
<td></td>
</tr>
<tr>
<td>Evaluated</td>
<td>Unknown</td>
<td></td>
</tr>
<tr>
<td>Success</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Result: Could have possibly been more successful if there was more options available to people other than cycling. The program was part of implementing the Metropolitan Transport Strategy.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference</td>
<td>(Wake, 1998; Transport, 1998)</td>
<td></td>
</tr>
</tbody>
</table>

**EcoTeam Program Evaluation**

<table>
<thead>
<tr>
<th>Country</th>
<th>Netherland</th>
<th>Objective: The EcoTeam Program (created by 'the Global Action Plan for the Earth') is used to foster sustainable behaviour within households. Aim: to see if sustainable household behaviour after participation in the EcoTeam Program was maintained.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commissioning body</td>
<td>Private</td>
<td>Funds</td>
</tr>
<tr>
<td>Time Frame</td>
<td>2 Years</td>
<td></td>
</tr>
<tr>
<td>Area</td>
<td>Community</td>
<td></td>
</tr>
<tr>
<td>Approach:</td>
<td>Information &amp; Leadership</td>
<td></td>
</tr>
<tr>
<td>Evaluated</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Success</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Result: Immediately after completion, participants had changed about half of the suggested environmentally relevant household behaviors and investments. Participation in the program also led to significant reductions in resource use. Two years after participation, 19 of the 26 behaviors and investments remained improved. Also, 4 of the 20 behaviors and investments that had not changed directly after participation appeared to have improved.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference</td>
<td>(Empowerment Institute, 2003) (Harland, 1996)</td>
<td></td>
</tr>
</tbody>
</table>
### Florida State University Carpooling

<table>
<thead>
<tr>
<th>Country</th>
<th>USA</th>
<th>Objective:</th>
<th>to increase the number of carpoolers at Florida State University.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commissioning</td>
<td>Government</td>
<td>body</td>
<td>Details:</td>
</tr>
<tr>
<td>Funds</td>
<td>Yes</td>
<td>Time Frame</td>
<td>0.25 Years</td>
</tr>
<tr>
<td>Area</td>
<td>Workplace</td>
<td>Approach:</td>
<td>Incentive</td>
</tr>
<tr>
<td>Evaluated</td>
<td>Yes</td>
<td>Success</td>
<td>Yes</td>
</tr>
<tr>
<td>Reference</td>
<td>(Jacobs, et al 1982)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Go Green

<table>
<thead>
<tr>
<th>Country</th>
<th>Canada</th>
<th>Objective:</th>
<th>The Better Environmentally Sound Transportation (B.E.S.T) objective is to promote the use of sustainable and appropriate forms of transportation in order to foster a higher quality of life for all British Columbians. GO GREEN Choices is a regional commute trip reduction service designed to reduce vehicle trips to the workplace.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commissioning</td>
<td>Government</td>
<td>body</td>
<td>Details:</td>
</tr>
<tr>
<td>Funds</td>
<td>Yes</td>
<td>Time Frame</td>
<td>2 Years</td>
</tr>
<tr>
<td>Area</td>
<td>Workplace</td>
<td>Approach:</td>
<td>Incentive &amp; Information</td>
</tr>
<tr>
<td>Evaluated</td>
<td>Yes</td>
<td>Success</td>
<td>Yes</td>
</tr>
<tr>
<td>Reference</td>
<td>(B.E.S.T., 2003) (B.E.S.T., 2000)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Green Commuter Planning

<table>
<thead>
<tr>
<th>Country</th>
<th>USA</th>
<th>Netherlands</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commissioning body</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Funds</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time Frame</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Area</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Approach:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Evaluated</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Success</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference</td>
<td></td>
<td>(Emerson &amp; Tansley, 1999)</td>
</tr>
</tbody>
</table>

**Appendix 1**

*Details:* Evidence is presented confirming the environmental importance of work-related travel. A recent guide to setting up a green commuter plan is summarized, as is a report evaluating the effectiveness of staff transport reduction programmes in the USA and Holland. The elements of an effective and comprehensive 'green change' strategy are discussed. These include site location, external lobbying, identifying cultural issues and marketing, as well as internal changes to direct transport related systems. Further research, multidisciplinary and applied is recommended.

Headstart

<table>
<thead>
<tr>
<th>Country</th>
<th>UK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commissioning body</td>
<td>Government</td>
</tr>
<tr>
<td>Funds</td>
<td>Yes</td>
</tr>
<tr>
<td>Time Frame</td>
<td>3 Years</td>
</tr>
<tr>
<td>Area</td>
<td>Workplace</td>
</tr>
<tr>
<td>Approach:</td>
<td>Information</td>
</tr>
<tr>
<td>Evaluated</td>
<td>Yes</td>
</tr>
<tr>
<td>Success</td>
<td>Yes</td>
</tr>
<tr>
<td>Reference</td>
<td>(Ciaburro et al, 1994) (Jones, 1998)</td>
</tr>
</tbody>
</table>

**Objective:** raise awareness of the car use problem, increase acceptance that individuals can contribute to solving the problem, change attitudes toward the car and encourage individuals to take action to change travel behaviour. Another important objective of Headstart was to encourage employers to develop commuter plans.

**Details:** Project initially focused on Segensworth but later expanded to include Solent Business Park. Provisional planning was completed to decide who needed to be involved. The employers were then visited and workshops were planned. The businesses enrolled and the first workshop was run. Travel to work questionnaires and informative newsletters were produced. A couple more workshops followed with reviews of the results from the questionnaire being examined. Funding (100 000 per year) came from the council itself and by the European Union.

ICARO

<table>
<thead>
<tr>
<th>Country</th>
<th>Multiple</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commissioning body</td>
<td>*</td>
</tr>
<tr>
<td>Funds</td>
<td>Yes</td>
</tr>
<tr>
<td>Time Frame (Years)</td>
<td>2.25</td>
</tr>
<tr>
<td>Area</td>
<td>Non specific</td>
</tr>
<tr>
<td>Approach:</td>
<td>Incentive &amp; Information</td>
</tr>
<tr>
<td>Evaluated</td>
<td>Yes</td>
</tr>
<tr>
<td>Success</td>
<td>Yes</td>
</tr>
<tr>
<td>Reference</td>
<td>(CORDIS, 2000)</td>
</tr>
</tbody>
</table>

**Objective:** to investigate the measures and instruments that can increase car occupancy.

**Details:** ICARO will research and deliver valuable and accessible recommendations and guidelines on how to increase car occupancy at both local and national levels. ICARO will identify best practices concerning technical instruments and organizational measures to increase private car occupancy, identify and understand the different frameworks that apply to different countries, carry out a number of real life demonstrations in four European countries, involving High Occupant Vehicle (HOV) lanes and simple and easy to implement schemes and finally disseminate the results to interested parties. To achieve a matching service database, 500 to 800 persons is estimated as a minimum. If the carpooling campaign is focused on a workplace, 100 persons is sufficient. Other criteria for a successful carpool include a well focused publicity campaign, cooperation with companies and local politicians, involvement of all public transport authorities, specific target groups, permanent enforcement and initiation of permanent measures. One of the most successful ways of increasing car occupancy, is to provide a separate lane for buses and HOVs.

**Results:** In Leeds, a HOV lane was introduced and car occupancy rate increased from 1.35 to 1.41 and the total number of cars decreased.
## INPHORMM

<table>
<thead>
<tr>
<th>Country</th>
<th>Multiple</th>
<th>Objective: INPHORMM is a research project funded by the European Commission's Transport Directorate (DG7) from February 1997 to September 1998. The project is designed to achieve the following seven objectives: 1. To provide a generic classification of information and publicity tools that can be applied in a transport context to influence travel behaviour. 2. To identify key target groups and the ways in which travel behaviour might be influenced by information and publicity initiatives. 3. To provide a comprehensive review of different kinds of information and publicity campaigns, and the policy objectives they have been intended to achieve. 4. To identify and describe a range of case studies demonstrating good (and bad) practice. 5. To develop a general model setting out relationships between objectives, information and publicity strategies, use of specific tools and likely behavioural outcomes. 6. To develop a number of 'concept campaigns' to illustrate how the principles derived under objective 5 might be applied in selected situations. 7. To ensure widespread dissemination of the findings among relevant public and private sector organisations.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commissioning body</td>
<td>Government Funds</td>
<td>Yes</td>
</tr>
<tr>
<td>Funds</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Time Frame (Years)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Area</td>
<td>Community</td>
<td></td>
</tr>
<tr>
<td>Approach:</td>
<td>Information</td>
<td></td>
</tr>
<tr>
<td>Evaluated</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Success</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Reference</td>
<td>(European Comission, 2000)</td>
<td></td>
</tr>
</tbody>
</table>
### Issaquah EcoTeam Program Survey

<table>
<thead>
<tr>
<th>Country</th>
<th>USA</th>
<th><strong>Objective:</strong> to foster long term sustainable behaviour within households.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commissioning body</td>
<td>Private</td>
<td><strong>Details:</strong> The EcoTeam Program was created by an international environmental organization called the Global Action Plan for the Earth (GAP). It is used to promote sustainable behaviours among EcoTeam participants and provides a detailed workbook that outlines the suggested sustainable behaviours. The main objective of the Issaquah EcoTeam survey was to determine the extent that previous EcoTeam participants made behaviour and lifestyle changes based on the actions presented in the program. The survey also revealed the benefits derived from participation. In the spring of 1998, a survey was mailed to 50 Issaquah-area residents who had participated in the Global Action Plan’s Household EcoTeam Program between 1992 and 1997. However, 25 of the households participated before 1995 and used a different version of the EcoTeam Workbook than the 25 households who participated after 1995. The two groups received different EcoTeam surveys. All participants were offered a canvas shopping bad or a water conservation kit as an incentive to complete the survey.</td>
</tr>
<tr>
<td>Funds</td>
<td>Yes</td>
<td><strong>Details:</strong> 62% (31) of the surveys mailed to the EcoTeam participants were completed. 26% of the respondents described themselves as “consistently practicing sustainable living” before the program. The remaining 74% of the respondents described themselves as practicing at lesser levels of sustainable living. However, after the program, an overwhelming 87% of the respondents indicated that participating in the EcoTeam Program “helped them go to their next level” of sustainable living. When asked about the values and beliefs derived from EcoTeam participation, respondents indicated that the program helped them develop a more informed and stronger stewardship ethic. The EcoTeam Program also helped them develop a greater appreciation of their role in creating a sustainable community and life-long sustainable lifestyle practises. With regards to activities outside the program, 45% of respondents indicated that they transferred knowledge gained from participating on an EcoTeam to their workplace, while 26% continued to interact with former team members in neighbourhood actions such as sharing tools and carpooling.</td>
</tr>
<tr>
<td>Time Frame (Years)</td>
<td>5</td>
<td><strong>Details:</strong> Another 26% volunteered to improve the neighbourhood in additional ways such as clean-ups and tree planting and 13% encouraged the government to provide other programs and services to support sustainable living. Respondents also indicated that the top program elements that enabled them to make changes in their resource use patterns were the support and encouragement of the EcoTeam, the step-by-step format in the EcoTeam workbook, and the knowledge learned from other EcoTeam members.</td>
</tr>
<tr>
<td>Area</td>
<td>Community</td>
<td><strong>Reference:</strong> <a href="mailto:info@globalactionplan.org">info@globalactionplan.org</a> (Global Action Plan, 2000)</td>
</tr>
</tbody>
</table>

### Jack Bell carpool

<table>
<thead>
<tr>
<th>Country</th>
<th>Canada</th>
<th><strong>Objective:</strong> to reduce pollution and traffic congestion as well as to reduce the number of SOVs on the roads.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commissioning body</td>
<td>Private</td>
<td><strong>Details:</strong> The foundation provides funds for organizations wanting to purchase vans for vanpooling, and also provides a carpool register and matchlist of commuters. The minivan operating costs are paid for by the JBF. Richmond Savings provided substantial financial assistance in the form of interest free loans for the purchase of the first 100 minivans. Canada Trust now funds the purchase of vanpool vehicles with interest free loans.</td>
</tr>
<tr>
<td>Funds</td>
<td>Yes</td>
<td><strong>Reference:</strong> (Jack Bell Foundation, 2003)</td>
</tr>
<tr>
<td>Time Frame (Years)</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>Area</td>
<td>Workplace</td>
<td></td>
</tr>
<tr>
<td>Approach:</td>
<td>Information</td>
<td></td>
</tr>
<tr>
<td>Evaluated</td>
<td>Unknown</td>
<td></td>
</tr>
<tr>
<td>Success</td>
<td>Unknown</td>
<td></td>
</tr>
</tbody>
</table>
### Just Walk it

<table>
<thead>
<tr>
<th>Country</th>
<th>Australia</th>
<th>Objective:</th>
<th>to increase the community’s participation in physical activity by encouraging individuals to walk together in groups in their neighbourhood.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commissioning body</td>
<td>Private</td>
<td>Funds</td>
<td>Yes</td>
</tr>
<tr>
<td>Time Frame</td>
<td>1 year</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Area</td>
<td>metropolitan</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Approach:</td>
<td>Involvement/GTP</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Evaluated</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Success</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Factors identified as important in implementing JWI included: 1) inter-agency collaboration, 2) strategic program planning, 3) targeting local coordinating agencies with strong community links and experience in implementing programs, 4) frequent support for local coordinators implementing the program, 5) program ownership in the local community and, 6) continued promotion and support from the Heart Foundation.

The findings suggest that the JWI model is an appropriate framework for disseminating walking programs throughout the state.

Reference: (Foreman, 2001)

### Lancashire Business Travel Plan

<table>
<thead>
<tr>
<th>Country</th>
<th>UK</th>
<th>Objectives:</th>
<th>The key aims for a Travel Plan are:  •Reduce single commuter car journeys, one person per car  •Reduce business mileage costs and subsistence  •Review the potential for alternative fuels  •Improve the transport within the business  •Encourage the greater use of alternatives modes of travel  •Improve the “neighbourly” image of the Company  •Encourage Partnerships between the Company, its staff and local transport operators including the Council  •Improve access to the business for staff and customers.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commissioning body</td>
<td>Local Government</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Funds</td>
<td>Y</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time Frame</td>
<td>2 Years</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Area</td>
<td>Workplace</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Approach:</td>
<td>GTP</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Evaluated</td>
<td>unknown</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Details: A Business Travel Plan is implemented in 3 stages: 1) Staff Travel Plan – commuting to work; 2) Business Travel Plan – reviewing business and travel costs; 3) Deliveries and visitors. Information is gathered by an Audit of commuter travel using a questionnaire developed for the site. The results are analysed to give a baseline understanding of the Travel to Work patterns of staff and their perceived constraints to change. An Action Plan is then generated from a Working Group on the basis of the survey results, consultations and evaluation of options and a set of measures developed that are achievable and sustainable in the short, medium and long term. These results are monitored on an ongoing basis and either promoted to refresh or reviewed on the results to date.

Reference: Lancashire County Council, 2000

### Living Neighbourhood SA

<table>
<thead>
<tr>
<th>Country</th>
<th>Australia</th>
<th>Objective:</th>
<th>As part of ongoing strategy to reduce the impact of the car in Adelaide, Steer Davies Gleave ‘Living Neighbourhood’ program was commissioned.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commissioning body</td>
<td>Government</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Funds</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time Frame (Years)</td>
<td>&lt;1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Area</td>
<td>Community</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Approach:</td>
<td>Involvement/GTP</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Evaluated</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Success</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Details: In a six month project in 1999 the entire community of Dulwich and Rose Park in the City of Burnside became a Living Neighbourhood. About 1500 people were invited to participate. The living neighbourhood approach is based on more than simply making people aware. It incorporates the ‘travel blending’ method developed by Steer Davies Gleave, but also aims to achieve social objectives toward urban regeneration through community participation.

Results: At the end of the project the results showed a 10% reduction in car trips in the neighbourhood, a 9% reduction in kilometres travelled by car, drivers reported 5% less time in the car and 20 minutes more leisure time per week, 6-8% increase in time spent walking, and a 15% increase in bus trips.

Reference: (Steer Davies Gleave, 1999)
## Managing Staff Trips

<table>
<thead>
<tr>
<th>Country</th>
<th>UK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Funds</td>
<td>Technology Support Unit (ETSU), Harwell, Didcot, Oxfordshire, UK. <a href="http://www.energy-efficiency.gov.uk/transport">www.energy-efficiency.gov.uk/transport</a></td>
</tr>
<tr>
<td>Time Frame (Years)</td>
<td>3</td>
</tr>
<tr>
<td>Area</td>
<td>Non specific</td>
</tr>
<tr>
<td>Approach: Involvement/GTP</td>
<td></td>
</tr>
<tr>
<td>Evaluated</td>
<td>Yes</td>
</tr>
<tr>
<td>Success</td>
<td>Yes</td>
</tr>
<tr>
<td>Reference</td>
<td>(Whitelegg, 2001)</td>
</tr>
</tbody>
</table>

## MOMENTUM

<table>
<thead>
<tr>
<th>Country</th>
<th>Europe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commissioning body</td>
<td>*</td>
</tr>
<tr>
<td>Funds</td>
<td>Yes</td>
</tr>
<tr>
<td>Time Frame</td>
<td>3 Years</td>
</tr>
<tr>
<td>Area</td>
<td>Non specific</td>
</tr>
<tr>
<td>Approach: Information</td>
<td></td>
</tr>
<tr>
<td>Evaluated</td>
<td>Yes</td>
</tr>
<tr>
<td>Success</td>
<td>Yes</td>
</tr>
<tr>
<td>Reference</td>
<td>(CORDIS, 2000)</td>
</tr>
</tbody>
</table>

**Objective:** Mobility management develops low cost concepts, strategies and actions that safeguard a given transport need for individuals, institutions and companies through the efficient use of available transport facilities or through strategies for avoidance of trips, promoting sustainable development.

**Detail:** MOMENTUM surveys mobility management concepts, strategies and tools, develops full service and integrated concepts for mobility centers, demonstrates and applies mobility management and finally disseminates the results. The use of promotion and raising awareness campaigns has been central to all the demonstration projects. Availability of funds is another important element to the success of the program. The following points are recommended for following projects; create partnerships, follow a step by step approach concentrating on already existing features, target specific people, differentiate the guidelines or recommendations according to the particular country and focus on advantages and positive impacts of mobility management.
### MOSAIC

<table>
<thead>
<tr>
<th>Country</th>
<th>UK/ Europe</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Objective:</strong> MOSAIC (MObility Strategy Applications In the Community) is a three year research project which began in January 1996. The main objectives of the project include: a common definition of Mobility Management *initiatives for passenger and freight transport, *design a universal Mobility Management Concept, *develop innovative strategies for Mobility Management *further develop Mobility Management components for field demonstrations in Germany, Great Britain and the Netherlands, *survey and assess the effects of field demonstrations *printed &amp; electronic guidance of how to introduce the Mobility Management Concepts.</td>
<td></td>
</tr>
<tr>
<td>Commissioning body</td>
<td>U</td>
</tr>
<tr>
<td>Funds</td>
<td>Yes</td>
</tr>
<tr>
<td>Time Frame (Years)</td>
<td>3</td>
</tr>
<tr>
<td>Area</td>
<td>Community</td>
</tr>
<tr>
<td>Approach:</td>
<td>Evaluated: Unknown, Success: Unknown</td>
</tr>
<tr>
<td>Evaluated</td>
<td>Unknown</td>
</tr>
<tr>
<td>Success</td>
<td>Unknown</td>
</tr>
<tr>
<td>Reference</td>
<td>(European Comission, 2000) <a href="http://www.rwth-aachen.de/isb/Ww/mosaic/">http://www.rwth-aachen.de/isb/Ww/mosaic/</a></td>
</tr>
</tbody>
</table>

### Off Ramp

<table>
<thead>
<tr>
<th>Country</th>
<th>Canada</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Objective:</strong> To promote environmentally sound transportation alternatives at schools within the lower mainland Vancouver.</td>
<td></td>
</tr>
<tr>
<td>Commissioning body</td>
<td>Government</td>
</tr>
<tr>
<td>Funds</td>
<td>Yes</td>
</tr>
<tr>
<td>Time Frame</td>
<td>Long Term</td>
</tr>
<tr>
<td>Area</td>
<td>Non specific</td>
</tr>
<tr>
<td>Approach:</td>
<td>Information</td>
</tr>
<tr>
<td>Evaluated</td>
<td>Unknown</td>
</tr>
<tr>
<td>Success</td>
<td>Unknown</td>
</tr>
<tr>
<td>Reference</td>
<td>(B.E.S.T., 2000)</td>
</tr>
</tbody>
</table>

Off Ramp has a long term focus of developing strategies to get students walking, cycling and taking transit more often. It intends to achieve this by raising awareness of transportation issues, hosting school events that offer the opportunity and incentives to try transportation alternatives to the car and by working to dismantle barriers to sustainable transportation in school communities. Primary funding came from The Climate Change Action Fund. Additional funding was provided by VanCity Credit Union’s Enviro Fund, RoadSense Team Lower Mainland North Brokers and BC Transit Victoria Regional Transit System.
### Promoting Public Transit

<table>
<thead>
<tr>
<th>Country</th>
<th>USA</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Objective:</strong></td>
<td>to decrease dependence on single occupant vehicles and to improve fossil fuel conservation.</td>
</tr>
<tr>
<td>Commissioning body</td>
<td>Private</td>
</tr>
<tr>
<td>Funds</td>
<td>Yes</td>
</tr>
<tr>
<td>Time Frame</td>
<td>&lt;1 Year</td>
</tr>
<tr>
<td>Area</td>
<td>Metropolitan</td>
</tr>
<tr>
<td>Approach:</td>
<td>Incentive</td>
</tr>
<tr>
<td>Evaluated</td>
<td>Yes</td>
</tr>
<tr>
<td>Success</td>
<td>Yes</td>
</tr>
<tr>
<td>Reference</td>
<td>(Bachman &amp; Katzev, 1982)</td>
</tr>
</tbody>
</table>

**Details:** A pilot program was designed to increase ridership on mass transit. A literature review revealed that commitment and incentives have been effective in promoting sustainable transportation. Then, non-bus riders were recruited and asked to participate in a pilot program. Those who agreed were given an identification card that was to be punched by the bus driver each time they rode the bus. Therefore, the frequency of bus ridership could be measured objectively. Participants were randomly assigned to one of four conditions: commitment, incentive, commitment and incentive combined or a control group. In addition, each group received information on routes and schedules. In the commitment group, participants agreed to ride the bus twice a week. Conversely, the incentive group did not commit themselves to bus ridership, but received free bus tickets. The combined group utilized both behavior change tools. Bus ridership was measured during treatment, after three weeks, and again after three months.

**Results:** All three treatment conditions were successful in increasing bus ridership. Furthermore, these results were maintained during both follow up measurements. In contrast, there was no change in the control group. However, commitment and incentives were most effective when used in combination with each other. During treatment, for example, the commitment only and incentive only group averaged 0.83 bus rides per week. In comparison, participants who received both interventions averaged 1.28 rides per week. Moreover, while free tickets may increase the total number of bus rides, it did not stimulate as many individuals to ride the bus as compared to the commitment conditions. Yet, the free ticket incentive is a financially feasible method of stimulation new ridership. During the follow-up period, the public transit system nearly tripled their initial investment.

### Reducing Gasoline Consumption

<table>
<thead>
<tr>
<th>Country</th>
<th>USA</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Objective:</strong></td>
<td>This project examined the impact of feedback on the gasoline consumption of a large segment of the population.</td>
</tr>
<tr>
<td>Commissioning body</td>
<td>Private</td>
</tr>
<tr>
<td>Funds</td>
<td>Yes</td>
</tr>
<tr>
<td>Time Frame</td>
<td>&lt;1 Year</td>
</tr>
<tr>
<td>Area</td>
<td>Metropolitan</td>
</tr>
<tr>
<td>Approach:</td>
<td>Information &amp; Leadership</td>
</tr>
<tr>
<td>Evaluated</td>
<td>Yes</td>
</tr>
<tr>
<td>Success</td>
<td>Yes</td>
</tr>
<tr>
<td>Reference</td>
<td>(Rothstein, 1980)</td>
</tr>
</tbody>
</table>

**Details:** Every evening during the 6:00 news, a local television station displayed a graph showing the number of gallons of gasoline consumed that day. The graph was on the screen for thirty seconds during which time the announcer offered a conservation tip, praise and attempted to encourage friendly competition between the two cities participating.

**Results:** During the first three weeks of the experiment, gasoline consumption decreased by 24.8, 27.2 and 37.6%. When the graph was taken off the air for a two-week period, consumption still remained 25% below what it had been during baseline. When the graph was returned to television, consumption decreased to 33.7%. Overall, the people of the Midland-Odessa areas lowered gas consumption by 31.5%.

### Research: Tertoolen

<table>
<thead>
<tr>
<th>Country</th>
<th>Netherland</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Objective:</strong></td>
<td>Research project on peoples attitudes to car use</td>
</tr>
<tr>
<td>Commissioning body</td>
<td>Government</td>
</tr>
<tr>
<td>Funds</td>
<td>Yes</td>
</tr>
<tr>
<td>Time Frame</td>
<td>8 weeks</td>
</tr>
<tr>
<td>Area</td>
<td>Non specific</td>
</tr>
<tr>
<td>Approach:</td>
<td>Information</td>
</tr>
<tr>
<td>Evaluated</td>
<td>Yes</td>
</tr>
<tr>
<td>Success</td>
<td>No</td>
</tr>
<tr>
<td>Reference</td>
<td>(Tertoolen, 1998)</td>
</tr>
</tbody>
</table>

**Details:** A pilot program was designed to increase ridership on mass transit. A literature review revealed that commitment and incentives have been effective in promoting sustainable transportation. Then, non-bus riders were recruited and asked to participate in a pilot program. Those who agreed were given an identification card that was to be punched by the bus driver each time they rode the bus. Therefore, the frequency of bus ridership could be measured objectively. Participants were randomly assigned to one of four conditions: commitment, incentive, commitment and incentive combined or a control group. In addition, each group received information on routes and schedules. In the commitment group, participants agreed to ride the bus twice a week. Conversely, the incentive group did not commit themselves to bus ridership, but received free bus tickets. The combined group utilized both behavior change tools. Bus ridership was measured during treatment, after three weeks, and again after three months.

**Results:** Even with individually directed feedback no change in actual transport behaviour was achieved. The information given to participants concerning environmental problems lead them to claim others were more guilty than themselves. They therefore need not alter their own behaviour to a more environmentally friendly direction.
### Appendix

#### Ride Arranger

<table>
<thead>
<tr>
<th>Country</th>
<th>USA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commissioning body</td>
<td>Government</td>
</tr>
<tr>
<td>Funds</td>
<td>Yes</td>
</tr>
<tr>
<td>Time Frame</td>
<td>&lt;1 year</td>
</tr>
<tr>
<td>Area</td>
<td>Workplace</td>
</tr>
<tr>
<td>Approach:</td>
<td>Information</td>
</tr>
<tr>
<td>Evaluated</td>
<td>Unknown</td>
</tr>
<tr>
<td>Success</td>
<td>Unknown</td>
</tr>
<tr>
<td>Results:</td>
<td>So far, 179 lockers have been purchased for use throughout the Denver region. More than 9,000 elementary and secondary school students in the Denver/Boulder metropolitan areas participated in the schoolpool program.</td>
</tr>
<tr>
<td>Reference</td>
<td>(DRCOG, 2000)</td>
</tr>
</tbody>
</table>

#### RideFinders

<table>
<thead>
<tr>
<th>Country</th>
<th>USA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commissioning body</td>
<td>Local Government</td>
</tr>
<tr>
<td>Funds</td>
<td>Y</td>
</tr>
<tr>
<td>Time Frame</td>
<td>Metropolitan</td>
</tr>
<tr>
<td>Area</td>
<td>Information &amp; Incentive</td>
</tr>
<tr>
<td>Evaluated</td>
<td>Unknown</td>
</tr>
<tr>
<td>Success</td>
<td>Unknown</td>
</tr>
<tr>
<td>Reference</td>
<td>(City of Colorado Springs, 2003)</td>
</tr>
</tbody>
</table>

#### Shifting to Sustainable Modes of Transportation

<table>
<thead>
<tr>
<th>Country</th>
<th>USA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commissioning body</td>
<td>Government</td>
</tr>
<tr>
<td>Funds</td>
<td>Yes</td>
</tr>
<tr>
<td>Time Frame (Years)</td>
<td>&lt;1</td>
</tr>
<tr>
<td>Area</td>
<td>Metropolitan</td>
</tr>
<tr>
<td>Approach:</td>
<td>Incentive &amp; Information</td>
</tr>
<tr>
<td>Evaluated</td>
<td>Yes</td>
</tr>
<tr>
<td>Success</td>
<td>Yes</td>
</tr>
<tr>
<td>Results:</td>
<td>Evaluation has revealed an increase in pedestrian trips by 3.5%, in bicycle trips by 2.2% and in transit trips by 1.7%. Between 1990 and 1994, there was a 6% modal shift from single-occupant vehicles. Moreover, Boulder's well planned transit system has played an important role in attracting interest from corporations who are looking for locations in which to set up office. Therefore, the program resulted in significant benefits for the local economy. More information about this cases can be found at: <a href="http://www.toolsofchange.com/English/CaseStudies/default.asp?ID=10">http://www.toolsofchange.com/English/CaseStudies/default.asp?ID=10</a></td>
</tr>
<tr>
<td>Reference</td>
<td>(Whitson, B., 2002)</td>
</tr>
</tbody>
</table>
Simon Kingham - research

Country: UK

Objective: Kingham (2000) examined people’s perceptions of their modal choice during the journey to work, addressing factors that influence modal choice, and whether people can be moved out of their cars to other more sustainable forms of transport.

Commissioning body: Government

Detail: The results of surveys of the commuting habits of employees at two UK companies are presented and compared with other relevant studies.

Funds: Yes

Time Frame: <1 Year

Area: metropolitan

Approach: Information

Evaluated: Yes

Success: Yes

Reference: (Kingham, 2000)

Smogbuster Way to Work

Country: Australia

Objective: Reduce air pollution and traffic congestion by encouraging use of alternatives.

Commissioning body: Government

Details: Workplaces are recruited by contacting a number of workplaces to determine interest. A survey is taken to access current practices. A GTP is developed in cooperation with the workplace, which gives a background to the project and workplace and aims of the plan, a review of current transport practices and travel patterns, an outline of recommended actions to reduce SOV and promote alternatives and suggestions of monitoring to measure progress of the plan.

Funds: Yes

Time Frame: 4 + Years

Area: Business District

Approach: Incentive & Information

Evaluated: Yes

Success: Yes

Reference: (Wake, D., 1999)

STEPS

Country: UK

Objective: to reduce SOV by 30% over 3 years

Commissioning body: Government

Details: Nottinghamshire Country Council officer Ian Chatfield introduced the program and later consults Steer Davies Gleave were used to advise on Travel Blending. The strategies include a car sharing system with a commuter database, preferential staff parking for carpoolers, public transport initiatives, a bike pool scheme for work related journeys, cycling initiatives and workplace cycle parking, showers and changing storage facilities. Nottinghamshire Country Council provided 40,000 in the first year and similar amounts in subsequent years. A grant was given from the Governments Cycle Challenge Fund to sponsor a state-of-the-art Cycle Centre at the main office. Incentives varied over the years but examples include, public transport passes, advanced cycle parking and changing facilities (including showers, swipe card access, lockers, drying cupboard, iron, hairdryers), Bikers Breakfast, car sharing scheme with preferential car parking spaces, ‘Bus Buddy’ Scheme, User Groups for various modes and Postcode Coffee Clubs to encourage car sharing

Funds: Yes

Time Frame (Years): 3

Area: Community

Approach: Incentive

Evaluated: Yes

Success: Yes

Reference: (Nottingham County Council, 1999)
### TAPESTRY

<table>
<thead>
<tr>
<th>Country</th>
<th>Europe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commissioning body</td>
<td>European Union</td>
</tr>
<tr>
<td>Funds</td>
<td>Y</td>
</tr>
<tr>
<td>Time Frame (Years)</td>
<td>3</td>
</tr>
<tr>
<td>Area</td>
<td></td>
</tr>
<tr>
<td>Approach:</td>
<td>Information</td>
</tr>
<tr>
<td>Evaluated</td>
<td></td>
</tr>
<tr>
<td>Success</td>
<td></td>
</tr>
</tbody>
</table>

**Objective:** TAPESTRY is the acronym for 'Travel Awareness Publicity and Education Supporting a Sustainable Transport Strategy in Europe', a collaborative research project. The overall aim of TAPESTRY is stated as: "to increase knowledge and understanding of how to develop effective communication programmes to support sustainable transport policies in Europe".

**Details:** "This will be achieved through exploitation of the main outputs of the project, which will be: 1) 16 travel awareness, communication, education and publicity case study campaigns, based on a combination of best practice and local needs across Europe; 2) documentary evidence about how each campaign was developed, monitored and evaluated in terms of their impacts on the, attitudes and behaviour of various target groups and organisations in each setting; 3) a formal assessment of the campaigns’ efficiency in terms of cost effectiveness, socio-economic influence and their contribution to long term sustainable travel patterns using the TAPESTRY common assessment framework; 4) development of common themes from the case study results at the cluster level that will help TAPESTRY to understand the transferability of the findings to other sites or communities.

Particular attention will be given to the development of partnerships between different economic and social sectors, public and private bodies and the general public, in promoting sustainable transport within the campaigns, and the integration of communication programmes with wider transport policies and plans. All these elements will be used to derive practical guidance on issues such as: the role of transport campaigns and communications measures within comprehensive transport policy; the importance of the relationships between national and local communications programmes; the campaign measures, messages and media appropriate to different circumstances; the campaign measures, messages and media appropriate to meet different objectives; methods for obtaining co-operation from all the necessary partner organisation required to design and run a successful campaign. It is only if the outputs of the project are interpreted in this practical way and publicised so that they are acted on by those decision makers who have the power to bring about change, that the TAPESTRY aim will have been properly achieved.”

<table>
<thead>
<tr>
<th>The Clean Air Campaign</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Country</strong></td>
</tr>
<tr>
<td><strong>Commissioning body</strong></td>
</tr>
<tr>
<td><strong>Funds</strong></td>
</tr>
<tr>
<td><strong>Time Frame</strong></td>
</tr>
<tr>
<td><strong>Area</strong></td>
</tr>
<tr>
<td><strong>Approach:</strong></td>
</tr>
<tr>
<td><strong>Evaluated</strong></td>
</tr>
<tr>
<td><strong>Success</strong></td>
</tr>
<tr>
<td><strong>Reference</strong></td>
</tr>
</tbody>
</table>

**Objective:** The Clean Air Campaign is a not-for-profit organization that works to reduce traffic congestion and improve air quality through a variety of voluntary programs and services, including free employer assistance, public information and children's education.

We focus on both congestion and air quality because they are linked - vehicle emissions contribute to smog formation. Formed in 1996 by government, business, civic, health, environmental and educational organizations, The Clean Air Campaign serves as a clearinghouse for a multitude of organizations that have programs in place to address traffic congestion and air pollution. Collectively they work with more than 600 employers in the region to mitigate traffic congestion and improve air quality. Funding for The Clean Air Campaign is provided by U.S. Department of Transportation Congestion Mitigation and Air Quality (CMAQ) funds. A twenty-percent match comes from business and government sponsorships.

<table>
<thead>
<tr>
<th>Travel For Work</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Country</strong></td>
</tr>
<tr>
<td><strong>Commissioning body</strong></td>
</tr>
<tr>
<td><strong>Funds</strong></td>
</tr>
<tr>
<td><strong>Time Frame (Years)</strong></td>
</tr>
<tr>
<td><strong>Area</strong></td>
</tr>
<tr>
<td><strong>Approach:</strong></td>
</tr>
<tr>
<td><strong>Evaluated</strong></td>
</tr>
<tr>
<td><strong>Success</strong></td>
</tr>
<tr>
<td><strong>Reference</strong></td>
</tr>
</tbody>
</table>

**Objective:** To facilitate the development and implementation of transport plans in workplaces.

**Details:** Travel for Work helps 57 member employers in Cambridgeshire to address their travel challenges and reduce the costs that travel imposes on the organisation and their staff. This is achieved through supporting the production of a Travel for Work plan in participating workplaces. Travel for Work plans set out targets and actions for employers to achieve travel reduction aims.

**Results:** TfW, and their member employers and staff, have taken cars off the road every day at peak times. Across the County as a whole, traffic volumes have grown at about 2.7% per year in the last few years. However, the 30,000 staff at TfW employers have bucked this trend by reducing the amount they use their cars to commute to work!

That means fewer cars on the road every working day. The trend percentage of staff at TfW employers driving alone to work has fallen in the last three years (from 57% in 1998 to 48% in 2001). Our annual survey suggests that people changing from car use are most likely to switch to cycling, with public transport also being popular.

<table>
<thead>
<tr>
<th>TravelSmart Brisbane</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Country</strong></td>
</tr>
<tr>
<td><strong>Commissioning body</strong></td>
</tr>
<tr>
<td><strong>Funds</strong></td>
</tr>
<tr>
<td><strong>Area</strong></td>
</tr>
<tr>
<td><strong>Approach:</strong></td>
</tr>
<tr>
<td><strong>Evaluated</strong></td>
</tr>
<tr>
<td><strong>Success</strong></td>
</tr>
<tr>
<td><strong>Reference</strong></td>
</tr>
</tbody>
</table>

**Objective:** Travelsmart is the name for a range of voluntary behaviour change projects and general awareness campaigns undertaken by Queensland Transport to encourage people to use more environmentally friendly transport such as public transport, cycling, walking and ride sharing.

**Details:** In addition to improving transport facilities such as cycleways and public transport infrastructure, a broad range of programs are being implemented to encourage change in behaviour. These include: working with businesses to identify travel patterns and reduce unnecessary trips; working with schools to raise awareness about car dependency and encourage trying other forms of transport; working in suburbs to make people aware of different transport options.
## TravelSmart SA

<table>
<thead>
<tr>
<th>Country</th>
<th>Australia</th>
<th><strong>Objective:</strong> Travel Blending(c) is piloted in two regions in Adeladie to reduce car use, and achieve sustainable behavioural changes.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commissioning body</td>
<td>Government</td>
<td><strong>Details:</strong> The travel blending strategy is provided to households in the form of five kits. Households form the basis of the approach, since travel behaviour research has consistently shown that travel and activity decisions are strongly influenced by intra household relationships and inter-dependencies. People and households choose to change their current behaviour by 1) observing their own travel patterns measuring the way they and their households use the car for one week. 2) recieving detailed suggestions customised to those travel patterns. 3) setting their own targets, 4) spending some weeks trying to reduce the use of the car, 5) observing the changes they have achieved, 6) being given a simple, ongoing system of monitoring and motivation. The approach can also be utilised by organisations. Carried out between April &amp; July 1997.</td>
</tr>
<tr>
<td>Funds</td>
<td>Yes</td>
<td><strong>Area</strong> Community <strong>Results:</strong> The level of reduction in car use was substantial (between 11% and 20%) for the entire population - even taking into account those non-participants who were assumed to continue using the car at high levels. This occurred despite cases in which people made increases. Some of these increases may have been even greater without travel blending. The reductions occurred in an environment where the only group pressure benefits came from within the household - the essentially random selection of households meant that there were rarely benefits gained from peer or group pressure. The study also occurred in winter when the options for changing mode (one of the four aspect of blending) was least favourable in terms of weather. The most common measured form of travel blending was, in fact, not changing modes, but chaining trips. There is verbal evidence that there was also unmeasurable increases in car sharing activity. On the evidence available, the technique brings about lasting changes in behaviour.</td>
</tr>
<tr>
<td>Time Frame (Years)</td>
<td>&lt;1</td>
<td><strong>Approach:</strong> Information &amp; Leadership <strong>Success</strong> Yes <strong>Reference</strong> (Transport SA, 1998) (Transport SA, 2000)</td>
</tr>
<tr>
<td>Reference</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## TravelSmart South Perth

<table>
<thead>
<tr>
<th>Country</th>
<th>WA</th>
<th><strong>Objective:</strong> To encourage contemplators in the South Perth Local Government Area (LGA), to use a range of green modes of transport.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commissioning body</td>
<td>Government</td>
<td><strong>Details:</strong> Program used individualized marketing and approached 860 people in the South Perth LGA. Resources were focused toward groups where change was possible. A range of travel modes were offered to households personally and incentives were given to encourage the use of green modes of travel. Free public transport passes valid for a month were offered as well as free bike maintenance checks at a local shop, free bike water bottle, cycling maps and information sheets, bus stop specific timetables delivered personally to peoples homes, local access maps created for the project and Heart Movers kits from the National Heart Foundation.</td>
</tr>
<tr>
<td>Funds</td>
<td>Yes</td>
<td><strong>Area</strong> Community <strong>Results:</strong> Program successfully increased Cycling - 91%, Public transport use - 14%, Walking - 16% and Car Passenger- 4%. Individualized marketing focused on a range of travel modes to meet peoples needs. Household members where reached personally. A survey showed that participants sustained travel behaviour change 12 months later.</td>
</tr>
<tr>
<td>Time Frame (Years)</td>
<td>5+</td>
<td><strong>Approach:</strong> Incentive <strong>Evaluated</strong> Yes <strong>Success</strong> Yes <strong>Reference</strong> Transport, 2000; John, G. 2001; James, 1999.</td>
</tr>
<tr>
<td>Reference</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Country</td>
<td>WA</td>
<td><strong>Objective:</strong> The Workplace Travelsmart Trial was a sixth month long, social marketing campaign aimed at employees in seven workplaces in Perth. Travelsmart promoted the personal and community benefits of using travel alternatives to 2000 people employed in the Perth CBD.</td>
</tr>
<tr>
<td>Commissioning body</td>
<td>Government</td>
<td></td>
</tr>
<tr>
<td>Funds</td>
<td>Yes</td>
<td><strong>Details:</strong> The trial relied on providing to the participants workplace specific newsletters, poster displays, brochures and information forums to promote walking, cycling, carpooling and public transport. Travelsmart promoted alternatives to the car using economic, environmental, time, convenience and health messages.</td>
</tr>
<tr>
<td>Time Frame (Years)</td>
<td>&lt;1</td>
<td></td>
</tr>
<tr>
<td>Area</td>
<td>Business District</td>
<td>A total of 937 people completed both pre-trial and post-trial questionnaires. The questionnaire covered a range of issues related to attitudes, beliefs, knowledge and actual behaviour. The results indicated an 11 per cent reduction in the number of drive alone car trips and a slight increase in knowledge about photochemical smog (knowledge was measured using 14 questions. Overall, people had low levels of knowledge about smog, with an average number of correct responses of just over 50 per cent); Very favourable beliefs about the need for individual change with a slight improvement over time; Very favourable attitudes to transport alternatives with a slight improvement over time; The baseline study indicated that 26 per cent of people had contemplated changing transport modes within the previous six months.</td>
</tr>
<tr>
<td>Approach:</td>
<td>Information</td>
<td></td>
</tr>
<tr>
<td>Evaluated</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Success</td>
<td>Yes</td>
<td></td>
</tr>
</tbody>
</table>

**TravelWise**

| Country | England | **Objective:** To raise awareness of problems associated with traffic growth, generate public acceptance for the need to change their travel behaviour, promote benefits and availability of cycling and walking, promote the use of public transport, change modal split from car to other modes and promote TravelWise to businesses and encourage them to take action. |
| Commissioning body | Government | |
| Funds | ? | **Details:** For schools, methods of communication included leaflets, walk to school events, resource packs, stickers, theater in education, competition, questionnaires, school bus theme, cycle training and pedestrian programs. For the general public, TravelWise used newspaper advertising, press releases, radio, videos, bus advertising, internet sites, public relations, newsletters, transport conferences and display boards. |
| Time Frame (Years) | 6+ | |
| Area | Business District | |
| Approach: | Incentive & Information | **Results:** TravelWise has grown to a membership of 80 organizations. A sample size of 10% recognize they have a role in the reduction of traffic and a significant reduction of car journeys to pilot schools was achieved. There was also an increase of 15% of pupils walking to school. |
| Evaluated | Yes | |
| Success | Yes | |
| Reference | (Sykes, 1998) | |
### Turn it Off: Anti Idling

<table>
<thead>
<tr>
<th>Country</th>
<th>Canada</th>
<th><strong>Objective:</strong> This pilot project sought to decrease the frequency and duration of motorists idling their vehicle engines.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commissioning body</td>
<td>Government</td>
<td><strong>Details:</strong> The pilot project involved staff approaching motorists at Toronto schools and Toronto Transit Commission &quot;Kiss and Ride&quot; parking lots and speaking with them about the importance of turning off their vehicle engine when parked and sitting in their vehicle. Approached motorists were provided with an information card and signs reminding motorists to turn off their engines were posted at both the schools and the Kiss and Ride sites. As part of the conversation, the motorist was asked to make a commitment to turn off their vehicle engine when parked. To assist the motorist in remembering to turn off their engine they were asked to place a sticker on their front windshield. The sticker served both as a prompt to turn off their engine and facilitated the development of community norms with respect to engine idling (the sticker, which was static-cling and was transparent, was placed on the front windshield of the vehicle with the graphic and text viewable from outside of the vehicle). Since the sticker was transparent its message was also visible to the driver. The information card, signs and sticker are available for review in the graphic database at the reference web site.</td>
</tr>
<tr>
<td>Funds</td>
<td>Yes</td>
<td><strong>Results:</strong> This project had three separate conditions. Two Kiss and Ride sites and two schools served as controls and received none of the above materials. In a second condition, two Kiss and Ride sites and two schools received only the signs. Finally, in the third condition, the personal conversations, which involved providing an information card and the sticker described above were used in conjunction with signs. Note that the signs alone (which is what most municipalities are likely to use) were completely ineffective. Motorists in the sign only condition were no more likely to turn off their engines than were the controls. However, the combination of signs, stickers and information cards (third condition) dramatically affected idling. In this condition, there was a 32% reduction in idling and over a 70% reduction in the duration of idling. These results are based on over 8000 observations of vehicles in the various parking lots. With the support of Natural Resources Canada, this pilot project is now being implemented across two Canadian cities: Mississauga and Sudbury. Results of this project will be posted as soon as they become available. The executive summary from the pilot project is downloadable in pdf format from the reference web site.</td>
</tr>
<tr>
<td>Time Frame (Years)</td>
<td>&lt;1</td>
<td></td>
</tr>
<tr>
<td>Area</td>
<td>metropolitan</td>
<td></td>
</tr>
<tr>
<td>Approach:</td>
<td>Information &amp; Leadership</td>
<td></td>
</tr>
<tr>
<td>Evaluated</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Success</td>
<td>Yes</td>
<td></td>
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</table>

### WALCYNG

<table>
<thead>
<tr>
<th>Country</th>
<th>Europe</th>
<th><strong>Objective:</strong> To develop guidelines for enhancing walking and cycling in order to replace shorter car trips and to make these modes safer.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commissioning body</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>Funds</td>
<td>Yes</td>
<td><strong>Details:</strong> WALCYNG marketing principals included definition and quantification of potential user groups, collection and evaluation of existing products for pedestrians and cyclists, definition of possible gaps in the existing product range, the development of new products and a description of supporting soft policy measures (advertising and lobbying).</td>
</tr>
<tr>
<td>Time Frame</td>
<td>2.5 Years</td>
<td></td>
</tr>
<tr>
<td>Area</td>
<td>Non specific</td>
<td></td>
</tr>
<tr>
<td>Approach:</td>
<td>Incentive &amp; Information</td>
<td></td>
</tr>
<tr>
<td>Evaluated</td>
<td>Unknown</td>
<td></td>
</tr>
<tr>
<td>Success</td>
<td>Unknown</td>
<td></td>
</tr>
<tr>
<td>Reference</td>
<td>(CORDIS, 2000)</td>
<td></td>
</tr>
</tbody>
</table>
## Walking the way to health

<table>
<thead>
<tr>
<th>Country</th>
<th>UK</th>
<th><strong>Objective:</strong> A new UK wide initiative is working to increase the health and fitness of at least 1.5 million sedentary people. Backed by a national health charity and government agency the challenge is to tackle the low level of walking, which is a major factor in the wasted potential for better health and well-being.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commissioning body</td>
<td>Government</td>
<td></td>
</tr>
<tr>
<td>Funds</td>
<td>Yes</td>
<td><strong>Details:</strong> The means is to encourage and co-fund community based schemes. Each has the freedom to reflect local needs, whilst working to a common set of components with known potential. These include programmes of led walks, information about places to walk, and modest improvements on the ground to make walking safe and attractive. Many are to be backed up by doctors encouraging their patients to walk more. The emphasis starts on walking for leisure because this is more likely to be an enjoyable and hence lasting activity. Brisk walking is the goal because this provides the greatest and quickest health returns. The end point is to make physical activity the norm, rather than the exception.</td>
</tr>
<tr>
<td>Time Frame (Years)</td>
<td>&lt;1</td>
<td></td>
</tr>
<tr>
<td>Area</td>
<td>Community</td>
<td></td>
</tr>
<tr>
<td>Approach:</td>
<td>Information &amp; Leadership</td>
<td></td>
</tr>
<tr>
<td>Evaluated</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Success</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Reference</td>
<td>(Ashcroft, 2001)</td>
<td></td>
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</table>

## Way To Go! School Program

<table>
<thead>
<tr>
<th>Country</th>
<th>Canada</th>
<th><strong>Objective:</strong> The Way To Go! School Program is designed to encourage children to walk, bike, ride-share, and take public transit to school rather than driving. It's goals are to make children happier, healthier and bring them closer to their neighbors.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commissioning body</td>
<td>Private</td>
<td></td>
</tr>
<tr>
<td>Funds</td>
<td>Yes</td>
<td><strong>Details:</strong> Way To Go! is a program that has been developed to reduce the impact of cars on the environment through a strategic approach for fostering sustainable behaviour through community-based social marketing. The Way To Go! School program and Active and Safe Routes to School across Canada have been employing the tools of community-based social marketing. When an individual signs up for this program they receive a Way To Go! kit. This kit provides environmental facts, statistics, and the rationale for a traffic reduction program. It stresses traffic safety information and the importance of choosing the best routes to school. This kit suggests ways to generate enthusiastic and sustainable involvement forms and models to use as the program is implemented. It involves using mapping strategies and the development of safe walking and biking strategies.</td>
</tr>
<tr>
<td>Time Frame (Years)</td>
<td>&lt;1</td>
<td></td>
</tr>
<tr>
<td>Area</td>
<td>School</td>
<td></td>
</tr>
<tr>
<td>Approach:</td>
<td>Information</td>
<td><strong>Results:</strong> more than 450 schools have requested the Way To Go! kit. Some schools report almost a fifty percent increase in the number of children walking to school. One school reduced the number of cars delivering children from 150 to just four. Both children and their parents have become concerned about the environmental impact cars are having on the environment. Parents are now becoming aware that their children enjoy walking to school, that their circle of friends has expanded, and their overall physical health is improving. Reportedly, parents were surprised to learn that their children did not know the route home from school, although this may be only three blocks. Fewer cars driving to these schools has resulted in a reduction in vehicle emissions and less traffic congestion, creating healthier, safer school sites. Children are becoming closer to their neighbors and gaining new experiences. Parents are finding that their children are happier, more physically fit and more enthusiastic about life.</td>
</tr>
<tr>
<td>Evaluated</td>
<td>Yes</td>
<td></td>
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<tr>
<td>Success</td>
<td>Yes</td>
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Appendix II

Ministerial letter of invitation to participate in the TravelSmart Workplace program
Dear «Title» «Surname»

**TRAVELSMART 1999**

In an effort to reduce air pollution in our city, a special program for workplaces in the Perth Central Business District has been developed. The TravelSmart program focuses on air quality problems associated with the use of motor vehicles for commuting to work, and aims to increase the use of alternative transport by commuters.

Travelsmart was trialed in eight workplaces around Perth in 1997 with excellent results. Not only was there a reduction of 10% in the use of cars to commute to work, but participants also reported health and work benefits. As part of a response to the Parliamentary Select Committee report on Perth’s Air Quality, TravelSmart will be run for a further three years in Perth workplaces.

The program involves four separate stages. The first stage involves a benchmark survey of the transport behaviour of employees. Following the collection of the surveys, the formal campaign begins and runs for approximately six months, during which time various information is provided to the employees. The third stage of the trial includes a re-evaluation of benchmark information in the form of a second survey, and is followed by stage four, the development of focus group problem solving in the workplace.

At the end of the program it is hoped to achieve at least a 10% reduction of single occupant vehicles coming to the workplace. In addition, it is hoped that employees will be healthier and more productive. Perth’s air quality is a serious issue, and one which depends on individual behaviour for improvement. Travelsmart will promote a better quality of life for all Perth’s residents by reducing traffic congestion and air quality problems.

I hope you will consider the benefits of participating in such a program. You will be contacted in the near future by a representative from the Department of Environmental Protection concerning possible involvement in TravelSmart. For your interest, please find enclosed a summary of the program with relevant contact details.

Yours sincerely

CHERYL EDWARDES (Mrs) MLA
MINISTER FOR THE ENVIRONMENT
Appendix III

Workplace Registration letter
Dear

TRAVELSMART 1999

Thankyou for your positive response to TravelSmart 1999. As one of the participating organisations, I would greatly appreciate you completing the attached registration form and returning it to me at the Department of Environmental Protection.

I would also like to use the logos for each participating organisation on TravelSmart material (eg. folders, newsletters) emphasising the partnership approach to this education campaign. If possible could you send a copy of your logo in TIFF or GIFF format to the following email address: catherine_baudains@environ.wa.gov.au

The program is due to begin on the 25th of January with the distribution of an introductory letter and benchmark survey to all staff. Before this time we will visit with you in order to arrange a display location, and the use of your internal mail for distribution of TravelSmart materials. We would like to include a brief outline of each participating organisation in the first newsletter so if you could provide one for your organisation that would be much appreciated.

Please contact me if you have any concerns or questions concerning TravelSmart. My contact number is 9222 7191, and my email address is given above.

Thankyou once again for your participation in this initiative.

Yours Sincerely,

Catherine Baudains,
TravelSmart Workplace Coordinator.
Appendix IV

Workplace registration form
TravelSmart Workplace Registration Form

Name of Organisation

Type of Organisation (eg construction)

Mission Statement (if any)

Environmental Policy
yes ☐ no ☐
If yes please outline briefly:

Environmental programs (Please list, eg. recycling)

Number of Employees
Full Time
Part Time
Casual
TOTAL

Workplace facilities
Bike lockers
Shower
Parking availability
Company cars

yes ☐ no ☐ number

Contact person
Name
Phone
Fax
Email

Organisation Logo enclosed
yes ☐ no ☐

It's how you get there that counts
Appendix V

Student Volunteer Application
TRAVELSMART APPLICATION FORM

Surname ___________________________ First Name ___________________________

Address ___________________________

Degree Programme __________________ Year of Study __________________

Date of Birth _______________________ Contact Phone _____________________

Selection Criteria
High level oral communication skills, especially an ability to confidently present information in variable situations

Awareness of environmental issues in WA.

Ability to work in a team environment.

Experience in giving presentations, facilitating groups and working with people such as, committees and community groups.

Good self management skills, self confidence and organisational competence with excellent time management skills.

Good environmental behaviour ethic and positive attitudes towards the use of alternative transport.

Ability to guarantee a commitment of three hours/week for the duration of the program.
Appendix VI

Student Volunteer Training Program and advertising material
TRAINING PROGRAM

Two Half Days  9am - 1.00pm

Contains four main modules
1: Environmental Issues, 2: Accountability, 3: Communication & Team Building, & 4: Workshop Facilitation

Day 1
9am  Registration and Introduction

9.15  The Travel Smart Program and your role
Explain the Travelsmart program, its goals and its importance

9.45  Module 1a - Environmental Issues: Air Pollution
Air Pollution & You
   - Perth’s Air Quality
   - Trends and Forecasts
   - The effect of reducing SOV trips
Common misunderstandings
Answers to commonly asked questions

10.45  Break: morning tea provided

11.00  Module 1b - Environmental Issues: Alternative Transport
Alternative Transport
Health benefits of using alternative transport
Environmental Benefits

12.00  Module 2 – Accountability
Your responsibility in representing the Department of Environmental Protection.

12.30  Preparation for Day 2
Start thinking about how to approach & present information to employees

1.00  Finish

Day 2
9.00  Introduction & Registration

9.05  Revise Day 1

9.30  Module 3 - Communication & Team Building (Professional Facilitator)
How to approach staff, what to watch for – irritation, interest, time constraints, How to pass on information effectively/efficiently/enthusiastically. Finding a level – creating a niche

10.45  Break: morning tea provided

11.00  Module 4 – Workshop Facilitation (Professional Facilitator)
Workshop presentation skills
The workshops to be run (content & organisation), and how to present them.
Practical

1.00  Finish
STUDENT APPLICATION INFORMATION

Apply to: Catherine Baudains,  
C/- Environmental Science,  
Murdoch University  
South Street, Murdoch, 6150.

Your application must contain the following
- A completed application form addressing the selection criteria
- A resume
- A cover letter explaining why you would like to be involved in the Travel Smart programme.

<table>
<thead>
<tr>
<th>SELECTION CRITERIA</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RELEVANT SKILLS AND ABILITIES</strong></td>
</tr>
<tr>
<td>• Ability to work in a team environment.</td>
</tr>
<tr>
<td>• Good self management skills, self confidence and organisational competence with excellent time management skills.</td>
</tr>
<tr>
<td>• High level oral communication skills, especially an ability to confidently present information in variable situations</td>
</tr>
<tr>
<td>• Ability to guarantee a commitment of three hours/week for the duration of the program.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>PREVIOUS EXPERIENCE</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Experience in working with people such as, committees and community groups.</td>
</tr>
<tr>
<td>° Experience in giving presentations and facilitating groups.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>RELEVANT KNOWLEDGE</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Awareness of environmental issues in WA.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>QUALIFICATIONS</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Enrollment in a degree from a recognised university such as a Bachelor of Education or Science or approved equivalents.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>PERSONAL</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Good environmental behaviour ethic and positive attitudes towards the use of alternative transport.</td>
</tr>
</tbody>
</table>
The TravelSmart Experience

What is Travelsmart:
Travelsmart aims to encourage people to translate their desire for change into practical outcomes. In particular, cause commuters who are currently Single Occupant Vehicle drivers to change their behaviour to include alternative forms of transport.

Baseline studies indicate that 10 to 20% of Perths commuters do not face major barriers to transport change (e.g., public transport available, showers available for cycling, they live within walking or cycling distance to work) (Marshall, 1997). Rather, they drive simply out of habit or a mis-perception of time or convenience issues. For many people in this group (those living close to work, those with good access to public transport nodes, etc., travel alternatives may be quicker, more convenient, safer, healthier and cheaper (Marshall, 1997). Individualised marketing approaches could target these positive messages to this group of commuters.

We need people to help by fulfilling certain roles in the participating workplaces. Thats where you come in.....

What You Get:
Gain valuable Environmental Leadership skills and experience while assisting with the coordination of environmental education campaigns within workplaces. Your experience will be officially recognised by the Department of Environmental Protection and Murdoch University in the form of a certificate and reference.

What You Do:
There are two types of involvement possible, requiring different levels of expertise.

Type 1) Assist with an information based education campaign
You would be responsible for the distribution and collection of information (newsletters, brochures, posters, etc.) and questionnaires, to one or more participating workplaces. This would require liasing with the Travelsmart coordinator and the representative in the workplace.

Type 2) Become an Environmental Leader in a workplace
You would be responsible for interaction with the employees, while distributing information (newsletters, brochures, posters, etc.) and questionnaires, to a single workplace. You would be required to present workshops (Training and format will be provided). You would be available to answer employees questions about the travelsmart program at certain times each week. You would be expected to be enthusiastic, encouraging the use of alternative transport.

Why not have a go?
Your Murdoch University training makes you perfect for the job!!
For more info Contact (Leave a message with your details):
Catherine Baudains : 9 360 6355 OR Peter Dingle : 9 360 2569
Appendix VII

Workplace Focus Group Schedule
TravelSmart Workplace
Ministry for Housing Focus Group
10.00am Tuesday 7th December, 1999
Plain St Perth, WA, 6000.

- How important is the TravelSmart Workplace message.
  4. What do you think about air pollution in Perth?
  5. What do you think about the use of personal cars in Perth?
  6. What might happen in the future if our transport behaviour does not change?
  7. What is the responsibility of Perth workplaces to endorse TravelSmart behaviour?

- How effective do you think the program was?
  - Did you change your transport behaviour?
  - Do they know of others (colleagues) who changed?
  - Why did/didn’t they change?
  - Were the messages relevant?
  - Was the material informative enough?

- How could this sort of program be made more effective
  - Within this workplace
  - In general
  - Content

5) Development or Changes
   Did you notice any changes in the workplace as the program progressed?

6) How do you feel about the program
  - How did you feel about participating in the program?
  - Did you feel it was a worthwhile exercise?
  - Do you feel it was effective in your workplace? (why/why not?)
  - How would you change it to be more effective?
Appendix VIII

Student Volunteer Focus Group Schedule
TravelSmart Volunteer Focus Group and Presentation.

Program
9.30am  Meet in Conference Room, Level 4.
        Help self to tea, coffee, muffins on tea trolley.
9.45am  Complete focus group questionnaire
10.00am Begin discussion of questions. Taped.
11.15am Move to level 9.
11.30am Introduction by C Baudains
        Presentation of Certificates and References by Phil Morgan AQMP.
12.00pm Light lunch served.

Focus Group Questions

1) Action
List the tasks you completed (eg distribute brochures, promote events, visit employees..)
Did you have any difficulties with these tasks ? Why/ Why not?
How important do you feel the completion of these tasks was to the overall program?

2) Atmosphere
Describe the atmosphere of the workplace environment? (eg busy, quiet, empty, )
Was it always the same?
Was there any reason for changes in the workplace?
Describe generally how the employees seemed when you were there. (eg interested, stressed, bored, frantic, angry, defensive)

3) Interaction
Did you have any interaction with the workplace contact?
Did you have any interaction with other employees?
Did you approach them or did they approach you?
Describe any interaction, (if questions were asked describe them too).

4) Specific Participants
If you encountered any employees in your workplace who you had repeated contact with, explain the relationship that formed and the interactions with such employees (both positive and negative).

5) Development or Changes
Did you notice any changes in the workplace as the program progressed?.

6) Your feelings
How did you feel about participating in the program?
Did you feel it was a worthwhile excercise?
Do you feel it was effective in your workplace? (why/why not?)
How would you change it to be more effective?
Appendix IX

Intervention type A and B interview questions
Workplace Evaluation Interview (Type A and B interventions)

1) How important is the TravelSmart Workplace message?
   a) What do you think about air pollution in Perth?
   b) What do you think about the use of personal cars in Perth?
   c) What might happen in the future if out transport behaviour does not change?
   d) What is the responsibility of Perth workplaces to endorse TravelSmart behaviour?

2) How effective do you think the program was?
   a) Did you change your transport behaviour?
   b) Do you know of others (colleagues) who changed their behaviour?
   c) Why did/didn't you/they change?
   d) Were the messages relevant?
   e) Was the material informative enough?

3) How could this sort of program be made more effective?
   a) Within this workplace
   b) In general
   c) Content wise

4) Development or Changes
   a) Did you notice any changes in the workplace as the program progressed?

5) How do you feel about the program?
   a) How did you feel about participating in the program?
   b) Did you feel it was a worthwhile exercise?
   c) Do you feel it was effective in your workplace? (why/why not?)
   d) How would you change it to be more effective?
Appendix X

Intervention C interview questions
TravelSmart Workplace

Workplace evaluation interview (Type C intervention)

**Question 1**
Why did the organisation participate in the TravelSmart Workplace program in 1999? What was it seeking to achieve?

**Question 2**
Who were the key people at the organisation involved in developing the Green Transport Plan? If a committee, can you describe the purpose of the committee and its membership?

**Question 3**
Do you have any comments on the process used to develop the Green Transport Plan? You may wish to comment on the time involved, the committee meetings, the use of the access audit and travel survey results.

**Question 4**
Do you think the plan, or the process of preparing it, helped raise awareness of travel alternatives in the workplace? Why do you think this?

**Question 5**
Was the Green Management Plan approved by management? If yes, when and by whom? Did they raise any issues about the content of the plan? If no, why not? How could approval have been made easier?

**Question 6**
Who is responsible for coordinating the implementation of the plan? Is there a steering committee or the like?

**Question 7**
Have any funds been allocated for implementation of actions in the plan?

**Question 8**
Have actions in the plan been implemented? If none, why? If yes, which actions? Complete implementation review table.

**Question 9**
a) Do you think the plan has reduced car trips/driver only trips to and from the workplace? Comment on how.
b) Do you think the program has influenced how empowered people are to act on the issues?

**Question 10**
Has a travel survey been undertaken to evaluate the impact of implementation of the plan on employees' travel behaviour? If no, is one planned?
**Question 11**
What further actions do you think are needed to reduce car trips generated by the workplace?

**Question 12**
Is it proposed that the plan be reviewed and updated? If yes, who will do this and when?

**Question 13**
Would you encourage other organisations to develop and implement a Green Transport Plan?

**Question 14**
Given the experience at your workplace, what do you think is needed to support organisations to develop and implement a Green Transport Plan?

*Any other comments:*

Workplace evaluation interview form
David Wake, Smogbusters, Conservation Council of WA Inc
November 2001
Appendix XI

List of pre and post intervention questionnaire items
List of Questionnaire Items

**Knowledge Scale (True/False)**

K1 Vehicle emissions contribute less than 25% to Perth’s photochemical smog problems
K2 In Perth, less than 25% of journeys are made in cars with only one occupant
K3 Photochemical smog problems occur mainly in winter months
K4 The average household in Perth spends $2250 on petrol each year
K5 Ozone gas is the major constituent of photochemical smog
K6 Photochemical smog makes the air look yellowish-brown in colour
K7 Photochemical smog problems are most severe in summer
K8 Using public transport, bikes, walking or teleworking can reduce air pollution problems
K9 Traffic congestion affects the reliability of public transport
K10 Motor vehicles produce more than 75% of Perth’s atmospheric carbon monoxide
K11 Less than 25% of nitrogen oxides in Perth’s atmosphere are produced by vehicles
K12 Smoke from domestic wood stoves is a major source of photochemical smog problems
K13 Using public transport, bikes, walking or teleworking can reduce traffic congestion
K14 The average running costs of a new medium sized car are less than $140 per week

**Environmental Behaviour (Never, Rarely, Sometimes, Regularly, Always)**

B1 At home do you Separate the garbage for recycling
B2 At home do you Make a special effort to conserve water
B3 At home do you Buy products in recycled containers
B4 At home do you Make a special effort to save energy
B5 At home do you Travel by car when you could walk or cycle
B6 At home do you Wash fertilisers, chemicals or oils down the drain

**Attitude Scales (Strongly Agree, Agree, Disagree, Strongly Disagree, Don’t Know)**

**Attitude 1 (air quality & car use)**

A1 Air quality is a serious issue in Perth
A2 Car drivers who have the opportunity to use public transport should do so
A3 Whenever possible people should try walking or cycling to work
A4 All drivers should ensure their cars are well maintained and regularly serviced.
A5 If convenient, employers should try to offer staff teleworking arrangements
A6 Car drivers should use the car less in order to reduce congestion problems.
A7 Cars should be used for trips to work only when alternatives are unavailable
A8 To improve air quality, people must reduce their reliance on car based transport
A9 All car drivers can help improve air quality by using the car less

**Attitude 2 (New Environmental Paradigm)**

A10 The balance of nature is very delicate and easily upset
A11 When humans interfere with nature it often produces disastrous consequences
Humans must live in harmony with nature
We are approaching the limit of people the earth can support
The earth has limited room and resources
There are limits to how much our industrialised society can expand
Industrial growth is necessary to maintain our economy
Humans have the right to modify the natural environment to suit their needs
Humans don’t need to adapt to the natural environment because they can shape it to suit their needs

Efficacy Scale  (Strongly Agree, Agree, Disagree, Strongly Disagree, Don’t Know)
E1 Individuals can make a difference to air quality and traffic congestion
E2 I have no choice but to use a car to go to work
E3 It is not my responsibility to try and reduce air pollution and traffic congestion
E4 I am in control of my own decisions about transport use
E5 My transport choice makes no difference to Perth’s air quality

Commute Trip (mode use)
5 day/10 trip panel survey : two trips each day recorded for a 5 day period.

Reasons for choice of mode (Ranked)
Exercise, Enjoyment, Convenience, Comfort, Cost, Length of Travel Time, Environmental concerns, Access to cheap/free parking, No car available, Car needed for work purposes, Run errands at lunch or after work, Live close to work, Other reasons (please specify)

Stages of change
SC1 Within the last six months, have you considered switching to another method of transport for any of your commuting journeys? (yes/no)
SC1a What alternatives have you considered? (list)
SC2 Within the last six months, have you actually switched to an alternative for any part of your commuting trips? (yes/no)
SC2a Which alternative have you switched to using? (list)

Work arrangements
W1 Does the nature of your work allow telework or other homebased work practices? (yes/no)
W2 During the regular working week (Monday to Friday), which of the following describes your existing telework or home working practices (Work at home at least one day per week, Work at home at least one day per month, Rarely or never work at home)
W3 Which of the following best describes your working hours? (Work standard hours (eg 9am - 5pm), Work flexi-time hours, Flexitime with rostered day off (RDO), Work fixed schedule with RDO, Choose my own working hours, Work shift work, Other)
W4 Which of the following categories best describes the work you most frequently do? (Clerical, Administrative, Managerial, Professional, Sales, Technical, Field work, Craft, Trade, Other)

Demographic information
Gender : Male, Female
**Age**: (Under 18, 18 – 40, 41 – 60, 61 – 65, Over 65).

**Suburb**: which suburb do you most frequently travel from for work.

**VKT**: Please estimate the distance you travel to get to work each day (in km’s)

**Interest in participant of GTP development** (type C workplaces only)
How interested would you in helping to develop a Green transport Plan for your workplace? (Very interested, A little interested, Not interested)

**Program development/ evaluation** (Time 2/post intervention only)
**P1** How useful were the following elements of TravelSmart Workplace to you? (VeryUseful, Useful, Sometimes Useful, NotUseful)

- **P1a** Display
- **P1b** Brochures
- **P1c** Newsletters
- **P1d** Workshops or seminars
- **P1e** TravelSmart Workplace Volunteer
- **P1f** Green Transport Plan

**P2** In your opinion, was the TravelSmart Workplace program effective? If yes, in what ways was it effective? How could it have been improved? (please attach an extra sheet if more space is required)
Appendix XII
Access Audit
<table>
<thead>
<tr>
<th>Question</th>
<th>Audit Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local government area (local council)</td>
<td></td>
</tr>
<tr>
<td>Number of employees in the building:</td>
<td></td>
</tr>
<tr>
<td>(full time)</td>
<td></td>
</tr>
<tr>
<td>(part time)</td>
<td></td>
</tr>
<tr>
<td>Floor Space (in sq m)</td>
<td></td>
</tr>
<tr>
<td>Access by Car</td>
<td></td>
</tr>
<tr>
<td>1.1 Name major roads used to access the workplace</td>
<td></td>
</tr>
<tr>
<td>Vehicle parking</td>
<td></td>
</tr>
<tr>
<td>2.1 Number of parking bays at the workplace:</td>
<td></td>
</tr>
<tr>
<td>2.2 What does Transport pay for parking bays (e.g. rental total and per bay per quarter)</td>
<td></td>
</tr>
<tr>
<td>2.3 How many parking bays are for employee use:</td>
<td></td>
</tr>
<tr>
<td>2.4 How are parking bays allocated to employees (based on seniority or need, part of salary package?)</td>
<td></td>
</tr>
<tr>
<td>2.5 Do employees pay for car parking at the workplace, if so how much?</td>
<td></td>
</tr>
<tr>
<td>2.6 Are parking bays provided for employees who carpool to or from work? If so, how many?</td>
<td></td>
</tr>
<tr>
<td>2.7 How many parking bays at the workplace are for business fleet vehicles:</td>
<td></td>
</tr>
<tr>
<td>2.8 How many parking bays at the workplace are provided for visitors</td>
<td></td>
</tr>
<tr>
<td>2.9 Are parking bays provided for disabled employees or visitors? If so, how many and where are they located?</td>
<td></td>
</tr>
<tr>
<td>2.10 What parking is available outside the workplace? At what cost to employees or visitors?</td>
<td></td>
</tr>
<tr>
<td>3. Vehicle fleet</td>
<td></td>
</tr>
<tr>
<td>3.1 How many vehicles are in the workplace fleet?</td>
<td></td>
</tr>
<tr>
<td>3.2 What does the vehicle fleet cost the business (estimate fleet leasing costs, does this include fuel and servicing)? (Excludes GVS contribution)</td>
<td></td>
</tr>
<tr>
<td>3.3 For what purposes are fleet vehicles used?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Question</td>
</tr>
<tr>
<td>---</td>
<td>---------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>3.4</td>
<td>How many employees have exclusive use of a vehicle?</td>
</tr>
<tr>
<td>3.5</td>
<td>Do employees drive fleet vehicles home? If so, how many employees are part of this arrangement?</td>
</tr>
<tr>
<td>3.6</td>
<td>Is ridesharing promoted for business trips involving fleet vehicles? If so, how?</td>
</tr>
</tbody>
</table>

### 4. Public Transport accessibility

<table>
<thead>
<tr>
<th></th>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.1</td>
<td>Nearest train station (note name, location and distance from workplace)</td>
</tr>
<tr>
<td>4.2</td>
<td>How frequent are train services at this stop (peak and off peak)?</td>
</tr>
<tr>
<td>4.3</td>
<td>What bus services run nearby?</td>
</tr>
<tr>
<td>4.4</td>
<td>Does the CAT bus service nearby? If so, note the nearest stop and service frequency:</td>
</tr>
<tr>
<td>4.5</td>
<td>Is any public transport information provided at the workplace? If so, describe what and where</td>
</tr>
<tr>
<td>4.6</td>
<td>Are multiriders available to employee for business trips. If so, describe how:</td>
</tr>
</tbody>
</table>

### 5. Cycling conditions

<table>
<thead>
<tr>
<th></th>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.1</td>
<td>Is bicycle parking provided at workplace? If so, how many? Is this adequate?</td>
</tr>
<tr>
<td>5.2</td>
<td>Is bicycle parking secure and sheltered – describe</td>
</tr>
<tr>
<td>5.3</td>
<td>Are lockers at workplace for cyclists to store clothes? If so, are they adequate?</td>
</tr>
<tr>
<td>5.4</td>
<td>How many showers available for use by cyclists? Is this number adequate?</td>
</tr>
<tr>
<td>5.5</td>
<td>What are cycling conditions like on surrounding roads? (check Perth Bike Maps or ask cyclists)</td>
</tr>
<tr>
<td>5.6</td>
<td>What are cycling conditions like on surrounding roads? (check Perth Bike Maps or ask cyclists)</td>
</tr>
<tr>
<td>5.7</td>
<td>Is there a bicycle pool at the workplace? If so, how many bicycles and how can they be used by employees?</td>
</tr>
<tr>
<td>5.8</td>
<td>Is bicycle parking provided for visitors? If so, describe location, security and shelter:</td>
</tr>
<tr>
<td>5.9</td>
<td>Is bicycle parking provided for couriers? If so, describe its adequacy:</td>
</tr>
</tbody>
</table>
### 6. Pedestrian amenity

<table>
<thead>
<tr>
<th></th>
<th>Question</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.1</td>
<td>Are there paths/paved sidewalks to the workplace? Note problem areas:</td>
<td></td>
</tr>
<tr>
<td>6.2</td>
<td>Are these well lit? Note problem areas:</td>
<td></td>
</tr>
<tr>
<td>6.3</td>
<td>Are local roads busy? Does this pose a hazard to pedestrians?</td>
<td></td>
</tr>
<tr>
<td>6.4</td>
<td>Are there safe crossing points? Where located? Note any problem areas.</td>
<td></td>
</tr>
<tr>
<td>6.5</td>
<td>What amenities and services (e.g. cafes, lunchbars, banks, drycleaners) are within walking distance of the workplace?</td>
<td></td>
</tr>
</tbody>
</table>

### 7. Workplace policy and activities

<table>
<thead>
<tr>
<th></th>
<th>Question</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.1</td>
<td>Does the business have a transport/travel policy? If so, obtain a copy</td>
<td></td>
</tr>
<tr>
<td>7.2</td>
<td>Have any activities been held at the workplace to promote travel alternatives? If so, describe:</td>
<td></td>
</tr>
<tr>
<td>7.3</td>
<td>Is any information on travel options made available to employees or visitors? If so, describe</td>
<td></td>
</tr>
</tbody>
</table>

### 8. Other

<table>
<thead>
<tr>
<th></th>
<th>Question</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.1</td>
<td>Notes on other issues affecting accessibility at or around the workplace and any suggested improvements:</td>
<td></td>
</tr>
</tbody>
</table>

---

*Access Audit Proforma
Developed by
David Wake, Smogbusters 2000*
Appendix XIII

TravelSmart Workplace Volunteer Journal
<table>
<thead>
<tr>
<th><strong>TravelSmart Workplace Journal</strong></th>
<th><strong>Week</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Name:</strong></td>
<td><strong>Workplace:</strong></td>
</tr>
<tr>
<td><strong>Date:</strong></td>
<td><strong>Start time:</strong></td>
</tr>
</tbody>
</table>

**Action**  List the tasks you completed today (eg distribute brochures, promote events, visit employees..)

**Atmosphere**  Describe the atmosphere of the workplace environment today? (eg busy, quiet, empty, )

Describe generally how the employees seemed today. (eg interested, stressed, bored, frantic, angry, defensive)

**Interaction**

- Did you have any interaction with the workplace contact today?  Y / N
- Did you have any interaction with other employees today?  Y / N
- Did you approach them (1) or did they approach you (2)?  1 / 2

Describe any interaction, (if questions were asked describe them too).

**Specific Participants**  If you encounter any employees in your workplace who you have repeated contact with, document your interaction with them here.

**Positive interactions:**

**Negative interactions:**

**Development or Changes**  If you notice any changes in the workplace document them here
Appendix XIV

TravelSmart Workplace Intervention Schedule
Program outlines for 1999 & 2000
Travel Smart Program Outline 1999

Objectives: Establish techniques to allow people to translate their desire for change into practical outcomes. Determine which techniques are most effective in inducing 10 – 20% of commuters who are currently Single Occupant Vehicle drivers to change their behaviour to include alternative forms of transport.

Outline: The program will be run over a period of three years in 36 workplaces. Each year contains 10 periods of activity, with four of these periods devoted to promoting specific travel alternatives. The 24 weeks of travel promotion will be the most involving, but planned activities such as guest speakers and workshops will take place over the lunch hour in order to avoid using employees work time. TravelSmart is coordinated by the Department of Environmental Protection. Contact details are provided on the following page.

The Program : Type A & B Interventions

<table>
<thead>
<tr>
<th>Content</th>
<th>Start date</th>
<th>Period #</th>
<th>Week #s</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evaluation, results, planning</td>
<td>4.1.99</td>
<td>Period 1</td>
<td>Weeks 1 - 3</td>
</tr>
<tr>
<td>Survey 1</td>
<td>25.1.99</td>
<td>Period 2</td>
<td>Weeks 4 - 7</td>
</tr>
<tr>
<td>Introduction into workplaces</td>
<td>22.2.99</td>
<td>Period 3</td>
<td>Weeks 8 - 9</td>
</tr>
<tr>
<td>Car pooling promotion</td>
<td>8.3.99</td>
<td>Period 4</td>
<td>Weeks 10 - 15</td>
</tr>
<tr>
<td>Cycling promotion</td>
<td>19.4.99</td>
<td>Period 5</td>
<td>Weeks 16 - 21</td>
</tr>
<tr>
<td>Walking promotion</td>
<td>31.5.99</td>
<td>Period 6</td>
<td>Weeks 22 - 27</td>
</tr>
<tr>
<td>Public Transport promotion</td>
<td>12.7.99</td>
<td>Period 7</td>
<td>Weeks 28 - 33</td>
</tr>
<tr>
<td>Survey 2</td>
<td>23.8.99</td>
<td>Period 8</td>
<td>Weeks 34 - 37</td>
</tr>
<tr>
<td>Focus Groups</td>
<td>20.9.99</td>
<td>Period 9</td>
<td>Weeks 38 - 45</td>
</tr>
<tr>
<td>Evaluation, results, planning</td>
<td>15.11.99</td>
<td>Period 10</td>
<td>Weeks 46 - 48</td>
</tr>
</tbody>
</table>

Breakdown of each time period:

**Period 1**
Week 1-3  **Planning, Coordination**  
Confirm workplace participation  
Determine numbers of employees  
Contact internal coordinator (usually human resources)  
Prepare & Assign TravelSmart Leaders

**Period 2**
Week 4-7  **Questionnaire #1**  
Send introductory letter to all staff  
Send pre-test questionnaire and cover letter to all staff  
Send reminder letters if required.

**Period 3**
Week 8-9  **General Introduction**  
Provide general introduction to TravelSmart & survey feedback  
Reward participants who are already using alternative transport,  
Set up displays in all workplaces and introduce TravelSmart leaders.  
Distribute first ‘Introductory’ newsletter.

**Period 4**
Week 10  **Car Pooling Promotion**  
Poster display  
Week 11  Information distributed (leaflet)
| Week 12 | Competition |
| Week 13 | Workshop : Setting up a carpooling database (TT) |
| Week 14 | Information distributed (leaflet) |
| Week 15 | 2nd Newsletter, publishing competition results |

| Period 5 | Cycling Promotion | 19th April |
| Week 16 | Poster display |
| Week 17 | Information distributed (leaflet) |
| Week 18 | Competition |
| Week 19 | Guest Speakers – Bike West? |
| Week 20 | Information distributed (leaflet) |
| Week 21 | 3rd Newsletter, publishing competition results |

| Period 6 | Walking Promotion | 31st May |
| Week 22 | Poster display |
| Week 23 | Information distributed (leaflet) |
| Week 24 | Competition |
| Week 25 | Guest Speakers – heart foundation? |
| Week 26 | Information distributed (leaflet) |
| Week 27 | 4th Newsletter publishing competition results |

| Period 7 | Public Transport Promotion | 12th July |
| Week 28 | Poster display |
| Week 29 | Information distributed (leaflet) |
| Week 30 | Competition |
| Week 31 | Workshop - Journey Planning (TT) |
| Week 32 | Information distributed (leaflet) |
| Week 33 | 5th and final Newsletter publishing competition results |

| Period 8 | Survey 2 | 23rd August |
| Week 34-37 | Send out second questionnaire and explanatory letter to all staff. Send reminder letters if required. |

| Period 9 | Focus Groups | 20th September |
| Week 38-45 | Set up short focus groups with willing employees in each workplace. (this will only take a short amount of time in each workplace) |

| Period 10 | Evaluation & Planning | 15th November |
| Week 46-48 | Analysis of the two surveys determining level of behaviour change. |

Contact Details
Catherine Baudains, TravelSmart Coordinator, Department of Environmental Protection
Phone : 9 222 7191
e-mail : baudains@essun1.murdoch.edu.au

Reference
Year 2000 outline

**Type B intervention : Information and environmental leadership.**
The type B intervention is essentially an information distribution program, which provides low level individualised marketing through the presence of an environmental leader. A basic outline of the program is provided below. The ‘promotion periods’ include distribution of leaflets, small scale competitions, information from relevant authorities and a guest speaker or workshop on the topic.

**Week Activity.**

**January**
1 Get list of employees from workplaces for database. Make contact with Heart foundation, transperth, Bikewest, MSR, RAC.
2 Volunteer Training days & allocation of workplaces.
3 Volunteers meet workplaces
4 Prepare questionnaires and arrange postage paid envelopes or internal collection point in all workplaces

**February**
5 Introduce program to employees. Send email/letter and questionnaire 1 out. Promote TSW Breakfast
6 Visit employees in the workplace (walk around and introduce yourself and offer services and ask about questionnaires. Promote breakfast
7 Collect questionnaire 1. Entry and analysis of data (8-11)
8 Set up introductory display. Double check dates for speakers, book rooms etc. Breakfasts

**March**
9 Change displays to cycling
10 Distribute cycling brochures (if they want one, also leave some on display)
11 Guest speaker/workshop - bikewest. Ensure access available.

**Apr**
12 Change display to walking promotion.
13 Distribute walking brochures (also leave some on display)
14 Guest speaker / workshop.

**May**
15 Change display to Public transport promotion
16 Distribute day riders & timetables
17 Public transport workshop

**Jun**
18 Change display to Car pooling and Teleworking.
19 Carpooling workshop

**Jul**
20 Remove display and Distribute second questionnaire
21 Chase up second questionnaire and distribute bike bottles

**Aug**
22 Run 1 hour focus groups in each workplace for evaluation purposes.

**Sep**
23 Recruit workplaces for 2001
24 Start evaluation and analysis of program.
25 Determine form of intervention for 2001
Year 2000 outline

Type C intervention: Employee Involvement and Environmental Leadership
The type C intervention aims to involve the participants much more in the process of addressing change. The environmental leader is available to support employees in working toward goals which are set by a working group or steering committee representative of the workplace. This intervention is more intensive than type C, but the employee ownership reduces the impact of the ‘external’ program.

Week Activity
January
2 Get list of employees from workplaces for database.
   Make contact with Heart foundation, transperth, Bikewest, MSR, RAC.
3 Volunteer Training days & allocation of workplaces.
4 Volunteers meet workplaces. Set dates for throughout program (ie: speakers, events)
5 Prepare questionnaires and arrange postage paid envelopes or internal collection point in all workplaces

February
6 Introduce program to employees
   Send email/letter and questionnaire 1 out.
   Promote TSW Breakfast
7 Visit employees in the workplace (walk around and introduce yourself and offer services) and ask about questionnaires. Promote breakfast

March
10 Establish working group/steering committee in participant workplaces to identify workplace goals and strategies. Hold fortnightly meetings in the workplace.
11 Change displays to cycling
12 Distribute cycling brochures (if they want one, also leave some on display)
13 Guest speaker/workshop - bikewest. Ensure access available.

Apr
15 Change display to walking promotion.
16 Distribute walking brochures (also leave some on display)
17 Guest speaker/workshop.

May
18 Implement chosen strategies and work towards goals. Allocate tasks to committee.
19 Change display to Public transport promotion
20 Distribute day riders & timetables
21 Public transport workshop

Jun
23 Change display to Car pooling and Teleworking.
25 Carpooling workshop

Jul
27 Remove display and Distribute second questionnaire
30 Chase up second questionnaire and distribute bike bottles

Aug
33 Run 1 hour focus groups in each workplace for evaluation purposes.

Sep
Appendix XV

TravelSmart Workplace Sample Brochures and Newsletters
Message from the Chief Executive Officer

Perth is a great place to live. Blue skies, clean ocean, beautiful beaches and a standard of living which many Australians can only dream about. I’m sure I’m not alone in wanting to keep Perth the way it is! Unfortunately, the rapid growth and development of Perth has not occurred without some problems. Two problems which we all now face are decreasing air quality and increasing traffic congestion. In response to growing scientific evidence and community concern about air quality, and its connection with transport issues, TravelSmart Workplace has been developed to help address these problems. TravelSmart Workplace aims to raise awareness and understanding of air pollution issues and the transport choices which Western Australians face.

TravelSmart Workplace will consist of a series of newsletters, information pamphlets and a poster display which will be regularly updated within participating Perth workplaces by a team of volunteer TravelSmart facilitators. The TravelSmart team will also be conducting a number of lunchtime forums which will promote awareness about the choices available to all of us when deciding how best to travel to work.

We should all be proud of our commitment to ensure that Perth’s air quality is protected. I’d urge you all to keep an eye out for TravelSmart information and activities over the next six months.

Dr Bryan Jenkins
Chief Executive Officer
Department of Environmental Protection

Who’s Involved?

TravelSmart Workplace is run by the Department of Environmental Protection, but the partnership approach to this program means many other groups are involved.

The participating workplaces for 1999 include Kvaerner, Clough Engineering, Homeswest, Marketforce, Hartley Poynton, Institute for Child Health Research, and the Department of Transport. (continued back page)

Editorial

Welcome to TravelSmart Workplace 1999! If you’re wondering what this is all about, then hopefully this introductory newsletter will answer most of your questions. This newsletter is the first in a series of five, which will be produced every six weeks. In this issue you’ll be able to read about the TravelSmart program, its purpose, whose involved, and some facts about Perth’s air quality. We hope to cover most of the issues which may be puzzling you about TravelSmart but please feel free to contact the campaign coordinator, Catherine Baudains, if you’ve got any queries. Happy travelling – and remember – it’s how you get there that counts!
Questions About TravelSmart

Is TravelSmart about forcing me out of my car?
No! The TravelSmart program aims to provide you with information about transport choices and options and relate these choices to issues of air quality and traffic congestion so that you can make an informed decision about the way you travel to work. For some people, alternatives to the car may be cheaper and faster than driving to work, whilst for others the car may be the only option available. TravelSmart aims to promote awareness of the full range of options available to Perth's commuters and outline how the transport choices we make impact on our air quality and traffic congestion levels.

What does TravelSmart Workplace involve?
TravelSmart Workplace is about creating awareness of air quality and traffic congestion issues.

The program promotes the idea that alternatives to the car such as walking, cycling, public transport, carpooling and teleworking are options for some people, some of the time. TravelSmart creates a link between the transport choices of individuals and the social and environmental impacts of pollution and congestion.

What's in it for me?
If you're concerned about environmental and social issues then TravelSmart will have benefits for you. At a personal level, the transport alternatives which TravelSmart will be promoting may make you healthier and wealthier. You may also find that trips to work become more convenient and enjoyable. At a community wide level, you will help improve air quality and reduce traffic congestion: problems which affect everyone's lifestyle.

What's the link between my transport choice and photochemical smog problems?
Department of Transport data indicates that over 90 per cent of the 55,000 vehicles that come into the Perth CBD each day for work only carry a single occupant. That means that 49,500 people drive to and from work in Perth every day on their own! The emissions from these trips are the single biggest contributor to Perth's declining air quality.

So what happens now?
The TravelSmart Workplace program runs for six months, and after the introductory period will promote a different alternative to the car in each of four six week periods. At the end of the program another questionnaire will be circulated (another chance to win!!).

Small changes by a large number of people can have huge outcomes in terms of urban air quality and traffic congestion.

If commuters changed from driving, to walking or catching the bus on one day every week they would reduce their journey to work contribution to emissions by 20 per cent.

Commuters who are unable to alter their single occupancy car transport methods can also do their part by having the car regularly serviced and tuned.

Every little bit helps. Simple, relatively painless changes now will avoid the need for complex, and expensive changes in the future.

Ultimately, air quality and congestion are issues that concern everyone. The TravelSmart Workplace program allows Perth's residents to get involved in maintaining our wonderful environment.
What is Photochemical Smog?

Photochemical smog is an often invisible cloud of air pollution composed mainly of the highly corrosive gas ozone ($O_3$). While ozone in the upper atmosphere protects us from the sun's harmful ultra violet rays, high ozone levels at ground level can lead to respiratory problems, and in some cases repeated exposure can be fatal.

Photochemical smog in Perth is formed when oxides of nitrogen and reactive organic compounds (ROC's) are carried over the ocean and are "cooked" in high summer temperatures.

High ozone can occur when the afternoon sea breeze then carries the plume of photochemical smog back over the metropolitan area.

The Perth Photochemical Smog Study indicated that in Perth, cars contributed more than half of the nitrogen oxide emissions which create photochemical smog (see figures). Industry sources are responsible for only 19 per cent of reactive organic compounds, and 44 per cent of nitrogen oxides, far less than the levels produced by cars.

Perth is not yet suffering acute photochemical smog problems, but last summer ozone levels exceeded World Health Organisation (WHO) standards 11 times. As Perth continues to grow and the number of cars on the road increases so will photochemical smog levels. To reverse this trend we must reduce our car use and use alternatives whenever we can.
Travelsmart crossword No 1

1 A  Percentage of vehicles commuting to Perth carrying a single occupant.
2 A  High levels of ozone at ground level cause what sort of health problems.
3 A  Travel daily to and from work in a City.
4 A  Bus, train and ferry are what sort of transport in Perth.
5 A  Main component of photochemical smog.
6 A  Season when photochemical smog mainly occurs.
7 A  Main source of emissions leading to photochemical smog in Perth.
8 A  Abbreviation of organisation running Travelsmart Workplace.
9 A  Pedestrian transport - good for the heart.
10 D  Commuting with more than one passenger in a car is to ......
11 D  To move an object or person from one place to another.
12 D  Percentage of reactive organic compounds from industrial sources.
13 D  Series of recurring events - also a form of transport.
14 D  Photochemical ......

More Info?

The Travelsmart team want to know about the transport issues in the metro area which concern you. We’d love to hear from you at any time during the campaign and should you have any queries or comments please feel free to phone or email Catherine at any time (contact details below). There is also a comments/suggestions/questions box attached to the Travelsmart display in your workplace. Please make use of this to help us improve the service we provide for you, and to enhance future Travelsmart Workplace programs.

You will be hearing more about these workplaces over the next few months. The combined number of employees for all these workplaces comes to approximately 2000. Imagine what a difference it would make if this number of people reduced their daily vehicle emissions! Supporting organisations which will be involved in providing materials, prizes, guest speakers and valuable information for the Travelsmart Workplace program include the Heart Foundation, Bicewest, Transperth, and the RAC. Keep an eye out for what they have to offer!

There are also nine volunteers from Murdoch University who will be acting as Travelsmart workplace facilitators, one or two will be working with your company. Each facilitator is responsible for Travelsmart materials and events in one workplace. These dedicated students will be available to support your workplace in varying capacities, and you will get to meet all of them through future issues of Travelsmart News.

MARKETFORCE ADVERTISING

Contact:
Catherine Baudains
Travelsmart Coordinator
Phone: 08 9222 7191
Email: catherine_baudains@environ.wa.gov.au

Department of Environmental Protection
Wesralia Square
141 St Georges Terrace
Perth WA 6000
Save your money! Save your time! Save your planet!

Carpool!

If four people travelled in one car instead of using four separate vehicles, we could eliminate 75% of the car trips made to work each day. Every litre of petrol you use produces more than two kilos of carbon dioxide, the main greenhouse gas. If you carpooled for just one day a week for a year, for a 30 km round journey to work, you could reduce carbon dioxide emissions by 350 kilos.

Carpooling can be flexible, it can be organised every day or just one day each week - depending on your needs. Whatever the case, car pooling is worth a try!!

The Department of Transport has calculated that for a return trip of 40 kilometres (five days per week for a year), car pooling can save motorists between $600 and $900 in fuel costs depending on the size of the car. Carpoolers can also save over $300 per year in parking costs. The City of Perth currently provides discount prices for car poolers in two of its city car parks. Better still, if you’re able to sell your second car by car pooling, you could actually reduce your transport bill by up to $10,000 per year. Just think of how you could use the savings - holidays, home renovations, investments!

Congratulations!

The data from the survey that was distributed late in January is currently being processed, and we should have some results for the next newsletter. Meanwhile it is time to congratulate the winner of the Bikewest mountain bike - the major prize drawn from the respondents. ...and the lucky winner is! Gerard Norris from Homeswest. Gerard uses public transport to get to work most days.

Don’t forget - for all those people who returned questionnaires this time there will be another bike up for grabs in September when the second questionnaire comes out. Keep an eye out for it! (More winners: page 4).

Rob Sippe presenting Gerard Norris with the bike he won in the Travelsmart survey draw.

Editorial

Now that we have officially started the TravelSmart program it is time to sit down to some serious thinking about transport alternatives to the drive-alone trip to work. If you have been looking at the display at your workplace you will have noticed that the first focus for the program is Carpooling.

Carpooling can be a great way to get to work, especially if you are able to travel with family, friends or work colleagues. Carpooling has all the comforts of travelling by car but reduces the negative impacts on air quality and traffic congestion by making better use of the vehicle. I hope you will seriously consider trying a travel alternative such as car pooling, cycling, walking or public transport for some of your trips.

Making the switch to a travel alternative means we can all enjoy the benefits of a less polluted environment well in to the future. Thanks for travelling smart!
Advantages of Carpooling

Carpooling doesn’t reduce air pollution as much as cycling or walking – a vehicle still travels from your neighbourhood to your workplace. You can still get stuck in traffic, and you may cause more congestion in your area compared to a bus, but...

...There are still economic, environmental and social advantages!

<table>
<thead>
<tr>
<th>ECONOMIC</th>
<th>SOCIAL</th>
<th>ENVIRONMENTAL</th>
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<tbody>
<tr>
<td>Saves you money on service and repairs.</td>
<td>Maintain luxuries of driving in a variety of cars.</td>
<td>Reduces levels of harmful emissions entering atmosphere such as greenhouse gases, carbon monoxide and photochemical smog.</td>
</tr>
<tr>
<td>Decreases the need for more roads, bridges and tunnels.</td>
<td>Easily organised with other workers.</td>
<td>Less parking space is required, providing for more space for street cafes and trees.</td>
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<tr>
<td>Saves your money on fuel costs.</td>
<td>Provides increased security to and from work.</td>
<td>Reduces the amount of stress caused from driving.</td>
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<tr>
<td>Discount parking prices are available for those who carpool to the city.</td>
<td>Very flexible programs.</td>
<td>Less car accidents and injuries.</td>
</tr>
<tr>
<td>Saves you money on parking fees.</td>
<td>Reduces amount of stress caused from driving.</td>
<td>Provides an opportunity for socialising while travelling.</td>
</tr>
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<td>Decreases the traffic congestion into work.</td>
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Questions of the month

Q) In the new Transform WA initiative to add another narrows bridge etc. have any plans been made to put in carpool lanes (ie you can only use them if there are at least two people in your car)?

A) A lengthy discussion paper entitled ‘High Occupancy Vehicle and Bus Priority Facilities for the Perth Metropolitan region’ was put together in 1997 as a joint project of Transport, Main Roads WA, Western Australian Municipal Association, Ministry for Planning and the WA Police Service. This document uses the research from a consultants study to develop a draft strategic framework for the application of High Occupancy Vehicles (HOV) and bus priority facilities to Perth. The paper suggests that application of HOV facilities need to be pilot tested and evaluated, and that this will be the responsibility of Main Roads WA through the HOV Priority Strategy Committee in consultation with stakeholder groups and the community.

This discussion paper is still available on the internet and can be found under ‘cars’ on the Transport page, the address being http://www.transport.wa.gov.au/linking/about_trans.html

Q) Are there any plans to extend the City of Perth car pooling parking? Apparently there is an area where you can park for only $2 per day if you have at least two people in your car but it is usually full by 7am.

A) Contacted City of Perth, the response was: Yes, plans exist to extend car pooling parking to the number 27 carpark in Mayfield St. Currently there are two carparks available for car poolers to park at $2 per day, these are number 3b on Grand Chancellor St, and number 13 on Broderick St.
How Much Is Your Car Costing You?

Did you know the National Roads and Motoring Association (NRMA) has estimated personal vehicle costs for new to 10 year old cars? This table shows average weekly and yearly average estimates for selected cars that are new to ten years old. These figures are based on an average distance travelled of 40km/day, an average fuel price of 75.8 cents per litre and vehicle maintenance costs (servicing and a range of replacement parts expected to be replaced for time and distance factors).

<table>
<thead>
<tr>
<th>Vehicle</th>
<th>Average (per week)</th>
<th>Average (per year)</th>
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<tbody>
<tr>
<td>Toyota Starlet 1.5</td>
<td>$86.82</td>
<td>$4514.64</td>
</tr>
<tr>
<td>Mitsubishi Mirage 1.5</td>
<td>$87.44</td>
<td>$4546.88</td>
</tr>
<tr>
<td>Holden Vectra 2.0</td>
<td>$106.82</td>
<td>$5534.64</td>
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<tr>
<td>Toyota Camry 2.2</td>
<td>$114.23</td>
<td>$5939.96</td>
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<tr>
<td>Mitsubishi Magna V6</td>
<td>$116.83</td>
<td>$6075.16</td>
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<tr>
<td>Toyota Conquest 3.8</td>
<td>$122.68</td>
<td>$6379.36</td>
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<tr>
<td>Holden Commodore 3.8</td>
<td>$123.32</td>
<td>$6412.64</td>
</tr>
<tr>
<td>Ford Falcon 4.0</td>
<td>$125.15</td>
<td>$6507.80</td>
</tr>
<tr>
<td>Honda Accord 2.2</td>
<td>$155.41</td>
<td>$8081.32</td>
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</tbody>
</table>


The ‘Travelwise’ car sharing scheme in England offers a free computerised matching service for people who are interested in carpooling. ‘Sharing instead of owning’ is a motto adopted by carpooling corporatives in Switzerland. More than 11,000 members share 600 cars as well as 25 sailing boats located throughout 300 communities and towns.

A study of a carpooling program in Germany found that when people joined, 54% sold their car, 13% have decided not to purchase a car.

In the Netherlands carpooling programs have reduced car usage by 30%.

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CARPOOLING

Helpful Hints for Carpooling

- Some employees have found it helpful to set up an emergency transport system so car pooling staff know they will always be able to get home if they are working late, the driver has gone offsite or there is an emergency.
- Arrange a contract with a local taxi or a car hire firm so that cars are always available.
- Seek out priority parking for car poolers where parking space is at a premium.
- Place a message in your internal newsletter or other administration system promoting car pooling.
- Set up a network which can give people a chance to meet other staff who live in their area and help arrange lifts.
- Perhaps identify one member of staff who can act as the co-ordinator.
- Establish the understanding that your carpool serves one purpose only - commuting to and from work - avoid personal detours for shopping and errands.
- Promote car pooling events such as a car pooling day for charity, car pooling coffee club etc.
- Work out a schedule for who drives when and plan out cost sharing for petrol, parking and vehicle maintenance.
- Discuss everyone’s preferences for radio stations, smoking policy, morning and evening leaving times and routes.
- Need to investigate insurance is adequate for all participants.
Travelsmart crossword No 2

1D Carpooling gives you more ... to do other things while you travel (like read)
2D Another word for versatile or bendy. Something a carpool can be.
3D Carpooling has environmental, economic and social ...
4D Sharing a ride can be a good ..... experience.
4A 'Sharing instead of owning' is a carpooling motto in this country.
5D Carpooling is relatively ...
6D Accessible, serviceable, not too much trouble.
7A Carpooling improves the quality of our ...
8A Some countries share these as well as cars.
9A Carpooling can ... time, money & the environment.
10D By sharing a ride to work you use less ....
11D Petrol and parking are significant ....
12A Reduced car trips into Perth results in reduced vehicle ...
13A Carpooling cuts ...
14A Two kilos of this are produced from one litre of petrol (abbrev.).
15A Those round black things that cost money. Tom sells them.

Introducing The Travelsmart Team

Over the last few weeks you may have noticed a stranger in your workplace. Someone wearing a smile and a Travelsmart T-shirt. That would be your member of the Travelsmart team, available to help your workplace develop better use of alternative transport. The Travelsmart Workplace team consists of a group of trained volunteers from Murdoch University and the co-ordinator. These people are available to answer your questions and gather information for you whenever you need. You can leave questions or comments about Travelsmart in the box provided by the display in your workplace, ask your Travelsmart team member, or contact the co-ordinator on 9222 7191.

More Information

The Travelsmart team want to know about the transport issues in the metro area which concern you. We'd love to hear from you at any time during the campaign and should you have any inquiries or comments please feel free to phone or email Catherine at any time (contact details below). There is also a comments/suggestions/questions box attached to the Travelsmart display in your workplace. Please make use of this to help us improve the service we provide for you, and to enhance future Travelsmart Workplace programs. Thankyou to those who have already provided us with feedback.

More Winners!!!

Winners of Travelsmart T-Shirts were Catherine Kane & Nicole Baas (Harley Poynton), Coll Keary (Transport), Akash Bina (Marketforce), Heather Ricketts (Kvaernor) and Aurora Wilson (Transport). Winners of RAC vehicle emission tests were K. Norris, Pam Ranford, and Deanna Swadling (Institute for Child Health Research), John Brewer and G. Rawlings (Clough), Kim Lighthoon (Health Department), Danna Potter (Myer), A. J. Heighway (Kvaernor), Jed Cant (Homeswest), and Emma Little (Marketforce).

Don't forget that for all those people who returned questionnaires this time there will be another chance to win in September when the second questionnaire comes out. Keep an eye out for it!

Contact:
Catherine Baudains
Travelsmart Coordinator
Phone: 08 9222 7191 Fax: 93221598
Email: catherine_baudains@environ.wa.gov.au

Department of Environmental Protection
Westralia Square
141 St Georges Terrace
Perth WA 6000
Bicycles
an integral part of healthy communities

Most people know that cycling is one of the most energy efficient, inexpensive and environmentally friendly modes of transport. But what are some of the other reasons why we should make bicycles a bigger part of our day-to-day activities?

Infrastructure, transport, energy conservation, health benefits, clean air, business development, and community development are some of the reasons listed by Bill Johnson, the chairman of the Barwon Bicycle Council. He states that the picture of a sustainable community based around bicycles is not an unrealistic one. It can happen if the right planning is done by the authorities, and the right incentives are in place to change community attitudes so that more people are won over by the bicycle.

Ultimately though - the choice to live in a sustainable society is made by individuals - the same individuals who choose to use a bike, sacrificing convenience for an improved way of life and an improved environment. Individuals have the power to create demand. Demand for better facilities for cycling. Cycling does make sense.

Rostrata Primary School Children agree: Cycling Makes Sense

Become a cycling role model

Without getting too technical, TravelSmart Workplace follows a 'social diffusion model' of behaviour change. Social diffusion is all about how new and innovative ideas, behaviours or technologies move through a society. As an example, think for a minute about personal computers - a few years ago, hardly anyone owned a personal computer but now they are commonplace. The process by which computers went from being a rarity to being commonplace is how social diffusion works.

Getting more people to ride bikes to work involves a similar process. Like a few years ago, when only a small number of innovative people had home computers, today, only the most innovative people are cycling. There is no doubt that if you're regularly cycling to work now, you are at the cutting edge of changes taking place in our society. Our task at TravelSmart Workplace is to 'speed up' this diffusion process and you can definitely play a part.

Your role as a cycling role model is invaluable in promoting cycling to other commuters. With your help, we will see more and more people take up cycling. Here's a list of thing's you can do:

- be a cycling 'ambassador' - talk to colleagues who drive about the benefits of cycling
- join a cycling organisation and become active in cycling issues - help to raise the cycling profile
- feel good about yourself and enjoy your cycling!

You are making a difference!

Editorial

The Perth Photochemical Smog Study (released by the Department of Environmental Protection in October 1996) indicates a clear link between increasing levels of photochemical smog and vehicles which are the principal source of smog in Perth. TravelSmart Workplace aims to promote awareness about these issues. If you're riding your bike to work you're helping solve the congestion and smog problems, so take a well deserved pat on the back! Thank you for your help!!

In this issue of TravelSmart Workplace News we also illustrate some of the personal benefits gained from cycling. Apart from the very real contribution to reducing air pollution and congestion, cycling to work increases fitness and improves our sense of well-being. So if you are thinking about changing the way you travel to work, bike it - you'll like it!
Australia Cycling, The National Strategy... A Summary.

This year the national strategy for cycling in Australia was released by the Commonwealth Minister for Transport and Regional Services, John Anderson. The document, developed by Austroads and the National Bicycle Council, provides a promising vision for cycling in Australia - it is not about elite sports, but rather about people using a bike to get to the shops, work, or to just wind down on the weekend.

Australia Cycling contains a number of objectives which are geared towards increasing cycling:

- Objective 1 deals with the development and maintenance of partnerships between the three spheres of government, industry, cycling and other non-government organisations, and the community.

By establishing these partnerships, the strategy will be able to be implemented effectively.

- Objective 2 seeks to integrate cycling into the policy and planning process. To overcome existing barriers, cycling must be integrated into the policies and plans of organisations involved in transport, health, environment, urban development, and recreation. Cycling can contribute positively to the goals of these policies.

- Objective 3 is about putting in place an integrated system of cycling facilities to increase bicycle use.

- Objective 4 seeks to continuously improve safety for cyclists. This means increasing the awareness of all network users about safe behaviour and improving the physical cycling environment.

- Objective 5 seeks to promote the benefits of cycling to the community. Through promoting the benefits of cycling and making accurate information available, the Australian community will be able to place greater value of cycling.

- Objective 6 seeks to build cycling into education, training and professional development. This is an important step as it aims to influence the current users as well as decision makers of tomorrow.

According to The Hon John Anderson MP, Minister for Transport and regional Services, all these objectives are deliverable, and include clear targets, time frames and responsibilities.

TravelSmart Workplace Survey results

In February this year we surveyed over 2000 people in seven large organisations in the Perth CBD. We had a good response, with 770 questionnaires returned. Just over 52% of the respondents were male and 47% were female. Fifty per cent of respondents indicated they were employed in clerical, administrative, or managerial positions, and another 30% are employed in professional positions. The largest number of respondents work standard hours (42.08%) followed by people working in flexi-time arrangements (24.94%).

There was a large variation between workplaces in the percentage of driver only car trips, ranging from 76% of trips in one workplace to only 18% in another. The breakdown of transport modes for the whole sample is shown in Figure 1. Check your TravelSmart Workplace display to see how your workplace compares.

Knowledge of air quality and transport issues was not too bad with 51% of all responses being correct, but nearly 30% of responses were marked 'don't know'.

and for some questions concerning causes of photochemical smog up to 57% of responses were incorrect.

![TravelSmart Workplace Survey results chart]

- Car drivers 48%
- Public transport 32%
- Other transport methods 20%

Figure 1: Transport behaviour or survey participants.

- Correct 51%
- Don't know 29%
- Incorrect 20%

Figure 2: Knowledge responses.

BIKEWEST coming to you!

Last month Jim Krynen, the liaison officer for Bikewest visited most of your workplaces. If you want more information you can contact him on 9320 9305.
Healthy Travelling

Including some exercise in your daily trip to work, such as cycling or walking, can greatly improve your health. Keep an eye out for more information from the Heart Foundation about the health benefits. Some copies of their newsletter should be available on the TravelSmart Workplace display in your workplace.

Try Cycling on the web!

Bicycle Transportation Alliance: http://sunsite.anu.edu.au/wa/bta
Bicycle Industry Australia: www.bikeoz.com
Cyber Cycley: http://cycley.com
Plus see the TravelSmart Workplace Newsletter in colour on the web by visiting www.environ.wa.gov.au and following the links.

Prepare to cycle...
Good Bicycle Planning:

If you live within a reasonable cycling distance of your workplace (anywhere from five minutes up to an hour’s ride is a good measure) then cycling might be for you. The TravelSmart Workplace survey indicated that at least 476 people participating in the trial lived within a half an hour cycle of the Perth CBD. Many other people live within cycling distance of train stations, bus stops or park ‘n’ ride facilities. The potential for people to start cycling for at least a part of their journey to or from work is huge. The contribution which switching to cycling (rather than driving the car), can make to reducing photochemical smog and congestion is also enormous.

Here’s a few tips to get you started.

- If you haven’t taken regular exercise for a long time, then it might be worth visiting your GP. They will be able to recommend a healthy exercise program, but in general, cycling is one of the safest forms of exercise.
- Build up your exercise gradually. Lift your pace or increase trip distance as your fitness level improves.
- If you want to cycle part of or even your whole distance to work, try to plan ahead. Make a ‘dry run’ by cycling your route on a weekend and see how long it takes. Try to carry everything which you would normally take to work. That way you’ll know if your bag will be too heavy!
- Try to drink 500ml of water half an hour before the start of your ride. In hot conditions try to drink small amounts of water as you go.
- Wear a cycle helmet and sun screen (especially if riding in the middle of the day). Light coloured clothing may also be sensible if you are cycling at night. Very small and bright flashing lights are also available from bike shops for around $20. They make you visible to traffic on even the darkest of nights.
- Cycling is not particularly strenuous but some people may prefer to shower and change when they arrive at work. If this suits you, then check out your office shower facilities.
- Cycle with a friend, colleague or partner. Cycling is good fun and sharing the trip means you can catch up on ‘quality time’ with someone you like! Having a cycling buddy can help with motivation (if the trip by car starts to look inviting).
- Try to stick to quiet side streets away from busy roads and use pathways through parks and other natural areas as much as possible. Try to vary your route so you remain interested in your surroundings. The ‘get back to nature’ feeling can be wonderful first thing in the morning!
- Enjoy yourself and relax: Cycling is one of the best ways to ‘do-stress’ and you’ll soon wonder why you’d been missing out on life by driving your car!

Questions of the month

Q. When and where are the police bike sales held, where unclaimed bikes are sold to the public?
A. Contact the WA Police Department, the response was: Held at Ross’s Auctions in Maylands. Auctions are held every six weeks. Contact Ross Auctions (ph: 9272 4644) for more details or the date of the next auction.
Quick Quiz
TravelSmart Workplace is all about promoting travel alternatives to the car as a way of reducing traffic congestion and photochemical smog. To enter the draw to win a $50 Myer voucher, correctly answer the following questions, cut out the coupon and return it to your workplace coordinator.

a. In Perth, more than 85 per cent of trips to work are made in cars with only one occupant.
   True  False

b. Ozone gas is the major constituent of photochemical smog.
   True  False

c. Photochemical smog makes the air look yellowish-brown in colour.
   True  False

d. Vehicle emissions contribute more than 50% to Perth’s photochemical smog problems.
   True  False

e. Photochemical Smog is a health risk.
   True  False

Walk To Work Wednesday
Our good friends at the Heart Foundation would like to let you know in advance that Walk to Work Wednesday will be held on Wednesday the 23rd of June this year. By encouraging people to walk some or all of the way to work on WTWW the Heart Foundation hopes to raise awareness of the range of health benefits brought about by incorporating a walk into your journey to work. Great prizes are offered on the day for those who leave their car at home and walk to public transport, walk to a friends to carpool, or those who manage to get their 30 minutes of daily exercise by walking all the way to work. By registering you will receive a free kit from the heart foundation and the chance to win great prizes. To register grab a copy of the Orange WTWW registration form from your TravelSmart workplace display – you may have already received a copy...

Bike Maps!
Perth Bike maps are available for purchase from the RAC, bike shops, newsagents, some book shops, and also Bikewest. These maps present invaluable information about cycling routes and road riding conditions to help you plan your ride to work.

Bikes on Trains
Did you know that you can take your bike with you on a train? If you live a long way from Perth but close enough to cycle to a train station you could ‘cycle’ to work without too much effort at all. To take your bike on a train during peak times (6.00am - 9.00am and 3.00pm - 6.00pm) you need a permit from the Passenger Service Manager at the end of the line you travel on. The permit is free and it allows the service manager to cater for the number of train riding cyclists. The permit is valid for three months. Once you have a permit you can take your bike on the train for an adult 1 zone ticket (around $1.70) which is valid for the entire day (this is in addition to your own ticket). An adult 3 zone ticket from Joondalup train station to Perth would cost you $3.20 (but with multi riders you can get trips as cheap as $2.40). You can pick up a copy of the ‘Bikes on Trains’ info brochure from Bikewest, or you can ask your TravelSmart Workplace Representative.

More Information
The TravelSmart Workplace team always love to hear from you and should you have any inquiries or comments please feel free to phone or email Catherine at any time (contact details below), or get in touch with the volunteer in your workplace. There is also a comments/suggestions/questions box attached to your TravelSmart Workplace display which is checked on a weekly basis.

Contact:
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Department of Environmental Protection
Westralia Square
141 St Georges Terrace
Perth WA 6000
Welcome to Walk Friendly

In 1998, the Ministry of Sport and Recreation re-visited walking in Western Australia through an interim programme called the Walking Initiative. Over many months we carefully examined the state of walking in WA, to enable us to better understand the next growth phase for this activity.

The Walking Initiative realised extensive feedback through a number of consultative forums, questionnaires to all local government authorities and considerable electronic and literature research. After the evaluation of this information the Ministry had a better understanding of how walking is perceived and accepted by the people of WA.

The findings of this investigation led us to embark upon a project that we believe will initiate, and foster, a much needed collaborative agency approach to the implementation of some desired environmental change.

"Western Australians understand the benefits of walking and with safer, more attractive environments will participate more."

The key issues that we have now identified are safety and security, access, aesthetics and comfort of which some elements are outside the impact areas of the Ministry of Sport and Recreation. This highlights the need for a collaborative approach to building a better walking environment. This will involve building links with key state government agencies such as Department of Environmental Protection, Transport, Main Roads of Western Australia, Ministry for Planning and importantly, local government authorities who play a key role in walk friendly streetscape design.

Western Australians understand the benefits of walking and the current participation levels are reasonably high, however we believe that safer, more attractive environments will encourage even greater participation.

Through this project that we have now named Walk Friendly, the Ministry of Sport and Recreation looks forward to strengthening working relationships with other key agencies to provide greater walking facilities and opportunities for Western Australians.

Watch for the latest developments in the Walk Friendly project on our web site at: www.msr.wa.gov.au. or for further information please contact:

Kay Speer at the Ministry of Sport and Recreation on 9387 9772 or email kspeer@wamsr.ausport.gov.au

Ministry of Sport and Recreation

Editorial

This issue of the TravelSmart Workplace newsletter concentrates on walking as a viable alternative to driving to work for some people.

Did you know that 17,754 Perth employees live 5Kms or less from work? If you are one of these people you could easily integrate a bit of daily walking into your working day. There are many benefits for you and for the environment.

Besides reducing air pollution and traffic congestion, the personal benefits of increased fitness and well-being which walking can achieve are almost immeasurable. If you already walk to work congratulations, and thank you. Maybe you can encourage some of your colleagues to try it out.
Walking Works

Most of us are unaware as we head off for a walk that we will be using more than half the muscles in our bodies. Even walking at a leisurely pace makes the muscles of the hips, buttocks, thighs, calves, ankles and feet simultaneously contract and relax.

Regular walking leaves your muscles in better shape and makes you feel good. As muscles go into action, their requirement for oxygen increases. Consequently, the heart and lungs have to work harder by stepping up the speed at which the blood circulates around the body.

Brisk walking is an aerobic exercise which, when sustained for about 20 minutes does just this. It increases the speed at which kilojoules are used up. Vigorous walking refreshes the mind. When you are tense, certain muscles, especially those in the back contract.

One of the best aspects of walking is that anyone can do it, no matter how unused to exercise they are.

Always wear a pair of supportive shoes with wedge heels and loose, comfortable clothes which do not restrict your movement.

Walk To Work Wednesday

This year the Walk to Work Wednesday will be held on June 23rd 1999. If you haven’t heard about this event before, it has been designed by the Heart Foundation to encourage people in the workforce to walk all or part of the way to work. It includes walking to or from public transport, walking to a friends to carpool or walking the whole distance. If you’re interested, you’ll need to pick up a WTTW kit which contains a promotional workplace poster, tally sheet and registration form so you can be in the running for some great prizes.

Contact details for registration are:
Fax : 9388 3383,
or post to PO Box 1133, Subiaco 6904.

For Your Heart’s Health

The Heart Foundation is an independent, Australia-wide, non-profit health organisation funded almost entirely by donations from Australians.

The Foundation’s purpose is to improve the heart health of all Australians and to reduce disability and death from heart and blood vessel disease by:

• promoting and conducting research to gain and apply knowledge about heart and blood vessel disease, it’s prevention and treatment; and

• promoting and influencing behaviour that improves heart and blood vessel health by conducting education and other programs directed at health professionals, those with heart disease and the Australian community at large.

Each year, the Heart Foundation conducts activities that educate the public and health professionals and attract comprehensive media coverage. This year, the Heart Foundation is focusing on nutrition with the theme “Eat Smart: make a healthy choice”.

Currently, 63 per cent of Australian men and 47 per cent of Australian women are overweight or obese. Further to this, a third to half of Australians aged under 70 have cholesterol levels greater than that recommended by the Heart Foundation. Heart and blood vessel disease is Australia’s number one killer, responsible for 42 per cent of the total number of deaths each year, and tragically affecting one in three Australian families.

In order to change these trends, we need to promote a healthy lifestyle. Education about exercise and healthy food choices is an essential component in helping Australians to change their lifestyle. Being active every day and being enthusiastic about physical activity, will not only help in the prevention of overweight and obesity, but also plays an important role in general health and well being.

Community groups, health professionals and workplaces all around the country are often involved in organising Heart Foundation activities. If your organisation would like a copy of the Heart Week Action Pack, please contact the national distribution centre on 02 6282 2144.
Are you active enough?

Completing 30 minutes of vigorous movement can offer the same benefits as a fully fledged workout.

If you're taking the stairs instead of the lift or walking to work instead of driving, you could be on your way to fitting exercise in while at work. To find out how well you're doing, try the following quiz. If you answer 'Yes' for most or all of the statements below you should be feeling pretty happy with yourself.

At Work:
1. I frequently take the stairs during work hours;
2. I usually walk to do my errands;
3. I go visit my co-workers;
4. I resist the urge to find the closest parking space; and
5. I walk some of the way to work.

At Home:
1. I do my own house cleaning and laundry;
2. I do my own gardening;
3. I play active games with the children frequently;
4. I have stairs in my house; and
5. I often do exercise while watching TV.

Walking for exercise

Today the average person burns 3350 fewer kilojoules a day than they would have 20 years ago. That's equivalent to three hours of daily walking that have simply vanished.

For exercise to do you any good, you have to get your heart pounding and keep it that way for at least 20 minutes or even better, an hour!

Forget 'no pain, no gain', one study showed that mailmen who walk 11km a day were as healthy as distance runners. At least 30 minutes per day of activity that's as demanding as a brisk walk is a good exercise routine. Always start at low levels and build up slowly over the weeks. Don't over do it otherwise you'll injure yourself and lose interest.

Raising your heart rate above its normal pace is the only way to improve your fitness and receive the benefits of exercise. A short burst of activity for half an hour will start to make a difference. Activities such as striding around a few blocks in your lunch hour with a friend from the office or parking your car a few blocks away from where you want to go and striding out the rest of the way. An easy walk for a few kilometres is just as good as a run over the same distance. They both use the same total energy - its the amount of energy that counts most, not how you use it up or how quickly you use it up.

Feet walk about 110 000km in an average lifetime or about three times around the world. The best way to walk, according to specialists, is briskly. A quick step is less tiring because the continuous forward momentum of a brisk walk literally takes some of the gravity induced weight off your feet. Let's look at how much energy walking actually uses: a light walk burns four calories per minute, brisk walking burns seven calories per minute and power walking burns 10 calories per minute.

Don't drive when you can easily walk

Walking is accessible, low cost, self managed and requires minimal organisation and equipment.

- Your body will love you for it and you'll benefit from having regular effective work outs;
- You will save money on petrol or bus / train / taxi fares. Buy yourself something more exciting than petrol;
- You'll help the environment by reducing fuel emissions;
- By avoiding the peak hour rush, you'll have more chance of being less stressed;
- Walking to work makes it easy to establish a fitness routine;
- It gives you an opportunity to appreciate the environment;
- We live in Perth - the climate is great;
- Cars pollute the external environment; walking improves your internal environment;
- You will feel more confident, happy and relaxed;
- It's a natural and safe body action;
- All your friends will be able to keep up; and
- It generates a positive mental attitude.
Outsmart the sweat - lose the layers

Walking to work can often raise a slight sweat and the clothing you wear is the key to help reduce it. During summer lycra bike shorts with a light t-shirt are ideal moisture munchers. In the colder months, layer up with comfortable clothes that keep you warm and dry, but don’t let you get hot. These clothes should also allow ventilation and protection from the wind with your clothing.

Don’t start without the right shoes

All purpose athletic shoes or running shoes are built for comfort and support. They compensate for walking on hard, unforgiving surfaces such as concrete and asphalt. Choose shoes designed for specific sports. Don’t wear tennis or basketball shoes when going walking. Corns and calluses are caused by friction and pressure on the feet, most often from incorrectly fitting shoes. Comfortable shoes are the best prevention. Shoes with shock absorbing soles will reduce the impact on your feet.

Breathe easy!

Taking a deep breath more often can be invigorating and cleansing. If our incoming breath is loaded with life-giving oxygen, our outgoing breath carries with it a cargo of wastes. Walking helps improve breathing without making you feel ‘puffed out’.

Extras to help you enjoy your walk: SPF sunscreen during summer to stop skin burns, sunglasses and a hat to reduce glare and sun stroke.

Get more movement while going to work!

The dangers of a sedentary life have become alarmingly clear.

Here are some hints to help you out:

- Get out of the car - where possible go part of the way to work by car, park and walk the remaining distance to work. Or stop the bus one or two stops before the usual stop and walk that little bit further to work.
- Go on 3 minute walks - short periods of activity is as good as exercising all at once, so take moving coffee breaks or lunchtime walks.
- Turn off email - communicating by computer is sure to keep you in your chair all day. Walk over and talk to your co-workers face to face.
- Forget the lift - take the stairs if you only have a few levels to go up. They are often next to the escalators or the lift.

Want to Get Involved?

Community activities:
- City to Surf
- Bridge to Bridge
- Walk to York
- Walk to Work Wednesday

Government agencies involved in increasing facilities for walkers:
- Heart Foundation - health benefits such as cardiovascular value
- Transport Department - alternative transport modes
- Ministry of Planning - liveable communities
- Educational institutions - physical activity in schools
- Local Government - use of facilities they provide
- Police - providing safety
- Ministry of Sport and Recreation - participation in physical activity

More Information

The TravelSmart Workplace team always love to hear from you and should you have any inquiries or comments please feel free to phone or email Catherine at any time (contact details below), or get in touch with the volunteer in your workplace. There is also a comments/suggestions/questions box attached to your TravelSmart Workplace display which is checked on a weekly basis.

Contact:
Catherine Baudains
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Traffic congestion in Perth

Current figures indicate that 65% of Perth’s 85,000 city based workers commute to work by car and that 90% of these commuters drive to work on their own. That is over 50,000 people. These single occupant trips are a highly inefficient way of moving around the city. This is especially true in terms of time and money lost when people are sitting in traffic jams, the waste of non-renewable fossil fuels, additional pollution and impacts on the health of all of us including increased stress resulting from increasing traffic volumes.

You may not be convinced that Perth is experiencing traffic congestion problems but the current rate of growth indicates the number of cars on Perth’s roads is set to double from 694,000 to more than 1.3 million in the next 32 years. The total number of kilometres driven in Perth is also set to increase from 25.8 million today to 59.3 million by 2029!

If we don’t reverse the car occupancy trends which Perth has seen over the last few years, traffic congestion will soon become increasingly noticeable in inner and near city areas where the road network is already established and little opportunity for further road expansion exists.

So what can we do? One solution is to build more road space. If we decide that we the convenience of driving in cars on our own, then building twice as much road space is the only answer to the increasing levels of traffic congestion. Imagine the Mitchell Freeway expanded to eight lanes of traffic flowing in each direction!

Another solution, and perhaps a more desirable way to reduce congestion, is to reduce the actual requirement for additional road space. A person driving to work on their own in an averaged sized car requires 60m² of road space. A bus passenger requires 9.4m² of road space, a cyclist needs just 3m² and a pedestrian requires a measly 0.5m² of road space. If we choose alternatives to driving alone to work on one or more days per week, considerable road space could be saved and congestion levels would decrease dramatically.

The alternatives needed to reduce the requirement for road space include more use of cycling, walking, public transport, car pooling and teleworking (working from home). These can save you money, and improve your health and wellbeing. Adopting one of these transport behaviours on just one or two days per week (but more is better) could be your biggest contribution to ensuring you live in a city which remains the best place in the world to live.

It's your choice.

More winners to come

Congratulations to our two latest bike winners. Susanne Peroni from the Institute of Child Health Research and Annalise Thompson from Hartley Poynton both won mountain bikes worth over $500 by entering the TravelSmart Workplace Cycling Challenge. These winners will benefit from the exercise of their cycling trips to and from work while helping us to preserve Perth's air quality for future generations.

Do you want a bike too? If you completed the first TravelSmart Workplace survey then you have a good chance to win one of these great bikes when you complete and return the second survey which will be being sent out at the end of August. You will also automatically receive a TravelSmart Workplace bike bottle when your survey is returned to the Department of Environmental Protection.

Win a Month’s Free Travel!
See back page for details....

Editorial

This month TravelSmart Workplace is promoting public transport. Public transport is a commuting option which we should all consider seriously. We could easily reduce traffic congestion and air pollution problems if we all replaced a couple of our current ‘driver only’ car trips with bus or train alternatives for the journey to work.

If you haven’t used public transport for some time, now might be a good time to give it a try. You may even find the chance to catch up on a good book, have a nap or just read the paper while you’re taken to work on a bus or train.

The opportunity to relax can make you wonder why you’ve bothered with the daily grind of car commuting for so long! Happy travelling!
Did you know?

Air Pollution from cars causes 300,000 extra cases of bronchitis in children, 15,000 hospital admissions for heart disease and 162,000 asthma attacks in children in Austria, France and Switzerland (World Health Organisation, 1999). In Australia we have a higher use of cars per capita and our fuels are a lower standard. Is your car damaging your health?

"The car is the technology which involves the biggest number of employees, the highest advertising budget, the largest accidental death rate and the biggest contribution to global warming" (Peter Newman, The Internationalist, June 99).

The average (Australian) car dumps about 4.3 tonnes of carbon dioxide into the atmosphere in one year.

Every litre of petrol saved reduces greenhouse emissions by 2.5kg.

You can make a difference!

In order to overcome the growing photochemical smog and traffic congestion problems now being experienced in Perth, TravelSmart Workplace is aiming to reduce drive alone car trips by 10 per cent. TravelSmart Workplace is asking you to reduce your driver only car trips by just two per week.

Two trips per week may not seem a lot, but in fact, two car trips per week adds up to eight trips per month, 100 trips per year or almost 10 per cent of the average 1,000 car trips taken per year by each individual driver.

If you want to make a difference to the quality of the environment in Perth, one of the biggest steps you can take is to reduce your reliance on the car for some of your travel needs. By making more use of a TravelSmart Workplace alternative (such as public transport) for some of your trips to work, you will be making a positive contribution to a cleaner environment. You can make a difference - it really is that simple.

Take public transport for cleaner lungs

Many people today are concerned about the environment, and deteriorating air quality. If you want to show your concern bear in mind that actions speak louder than words!

One solution to the problems of declining air quality and increasing traffic congestion is to catch the bus or train a lot more! Leaving the car in the garage for trips which you could use public transport has many personal and community benefits.

1. Using public transport can save you money. Besides saving on the usual running costs of a car, you'll also save on parking costs in the city. In fact, the RAC believes that using public transport to get to work is two and a half times cheaper than driving a car. Just think what you could do with all the spare cash which you presently spend just getting to work!
2. Using public transport can help reduce your stress levels - you can read, catch up on some paper work, have a nap or share a conversation.
3. Many public transport routes to the city are now fast and direct - you need never waste time stuck in traffic jams again!
4. Public transport is the safest way of getting about the city. No Transperth passengers have ever been killed when using public transport to get to work. Car accidents have caused 111 deaths this year already.
5. Less car trips mean lower pollution levels and less congestion. Less congestion and less pollution benefits everybody
6. Using public transport shows a genuine concern for the environment.

$28 week pay increase on offer

Imagine that for five days each week, you drive a typical small to medium car like a Toyota Starlet (1.5L) to and from work over the Perth average commute distance of 20 kilometres. According to the NRMA, the weekly driving costs (fuel, tyres, servicing, etc) but not including ownership costs (such as insurance, interest repayments and depreciation) of running a Corolla for work purposes amounts to $22.28 per week (11.14 cents per kilometre). When you add the $25 average weekly parking costs to the running costs, it shows that driving even a small car into the city is going to cost at least $47 each week. In comparison, a person who uses a two zone MultiRider Plus Fascard for the same trip to work spends only $18.75 to get to and from work each week. What could you do with the extra $28.50 which regular train and bus passengers are already saving? If you sell your second car and start to use public transport for the easy trip to work in the CBD, you could save even more money!
Safety facts

- The number of car drivers and passengers killed on WA roads has increased by nine per cent over the past five years.
- In 1997, 197 car drivers and passengers were killed on the roads in WA.
- Public transport is the safest way of getting around Perth. Of the 209 persons killed on WA's roads in 1995, none were killed while using public transport.
- In 1995, there were 37,287 road accidents reported to the WA Police Service.
- No Transperth or Westrail passengers were killed while using public transport during the whole of 1996.
- In 1995, 64 per cent of all serious accidents occurred during daylight hours.
- The annual cost of road crashes to the WA community exceeds $2 billion dollars. This is a 'hidden' cost of car travel.
- Besides the usual running costs of a car such as fuel and parking, every person in WA contributes more than $1,200 each year to the costs associated with accidents on the roads.
- Fatal accidents on the roads cost Western Australians about $1,138 million dollars each year.
- Hospital costs associated with vehicle accidents cost the WA community a further $281 million each year.
- In 1995, 71.5 per cent of all serious car crashes occurred on a week day.
- In 1995, over 80 per cent of serious car crashes occurred in dry weather conditions.

Public transport on the international scene:

World Health Organisation, Ministerial Conference focused on transport issues.

Frank Dobson, British Health Minister, opened the conference, hosted by the WHO, World Health Organisation (European Region), on 16 and 17 June 1999 in London. The event brought together Ministers of Health and Environment with their delegations from the 51 countries of the WHO European Region. The attendees list included EC Commissioners, Deputy Ministers of USA and Canada, Directors General of WHO and other UN bodies.

The Ministerial Conference adopted a Declaration of Intent on the most pressing areas of concern for health in Europe. It is focusing on transport, which is considered to have more impact on environment, health and safety than any other economic sector. The Declaration commits European governments to action, recognising that transport plays a major role in life today. Whilst Ministers of Environment and Transport have supported similar declarations in the past, Ministers of Health have now added their commitment, along with governments from Eastern Europe.

A Charter on Transport, Environment and Health was adopted, focusing on measures to reduce environmental pollution, accidents and noise associated with transport. It also seeks action to reduce social exclusion, which results from dependence on private, rather than public, modes of transport. The UITP/Euro Team, the International Union (Association) of Public Transport, has been intensely involved in the working group and the negotiations that have produced the Charter. It will prove invaluable in encouraging support for public transport and sustainable transport modes.

True Story.... could this be you?

Earlier this year the TravelSmart Workplace team fielded some enquiries about public transport services in some Perth suburbs. Most of these enquiries were answered with very positive results.

In one case an employee who lives about 40km south of Perth wanted to know if there were any bus services to Perth in their area. We were able to use the Transperth journey planning service on the internet to discover that an express bus left approximately 500m from their house, taking only 15 minutes to get into the heart of the city, quite close to the workplace.

Since that time the employee has not needed to drive to work, and since they work everyday that means there will be about 250 less car trips into Perth in the next year.

For every person that can leave their car outside the city - our air quality is improved. The more people who make 250 less trips a year, the greater the improvement.
The challenge of public transport: The city of tomorrow

The following is an excerpt from the 1999 London Transport annual lecture, highlighting the role public transport has to play in the protection of the environment. The complete document can be found at http://www.uitp.com/news/pr0024.htm

"The sensitivity of public opinion on this question has risen steadily over the past decades and now involves the city itself. It must be admitted that cities do accumulate nuisances of all kinds. Traffic jams offer a concentrated example of this, with road congestion, noise, and air polluted by exhaust gases.

As far as the environment is concerned, there can be no two ways about it; public transport offers a far better solution. It is the real answer to all these urban problems. Although it is still usually relies on diesel engines, even the bus pollutes up to 20 times less per passenger kilometre carried than the private car. It also occupies far less space (in peak conditions, one tenth of that required by the car.)

Electrically-powered modes, such as trams, trolley buses, and metros produce zero local pollution, are quieter and, with their usually higher carrying capacity, are still more efficient in their use of space, particularly in the case of metros.

Transport modes such as those running on electricity, like metros, regional trains or trams, are far away the best transport solution when the level of demand permits. The figures are even more impressive for buses, and indeed speak for themselves. Even if we only take rough estimates, buses occupy ten times less space per passenger transported and pollute 20 times less than private cars.

Nevertheless, although this superiority has been statistically proven, that does not seem enough. Public opinion demands - and will increasingly demand - "clean" buses. If public transport genuinely wishes to be the defender of the environment, and this is to be believed, it must conform to the most stringent and most recent standards. Luckily, technical advances have brought us some answers today:

a) buses can be adapted to limit harmful exhaust gases due to traditional fuels;

b) the traditional diesel fuelled vehicles have been improved, with more efficient engines, cleaner fuels (low sulphur fuel, aquazole etc.), and particulate and catalyst filters;

c) as regards alternative energy, while electrical buses are still handicapped by cost and battery capacity, "clean" energy such as natural gas and LPG offers promising alternatives.

d) finally, hybrid solutions combining a heat source with electrical wheel motors have been developed."

Win a months free travel!

TravelSmart Workplace is all about promoting travel alternatives as a way of reducing traffic congestion and photochemical smog. To enter the draw to win a Transperth Multirider Plus ticket (40 trips), correctly answer the following questions, cut out the coupon and return it to your workplace co-ordinator. The new Multirider Plus tickets give a 25 per cent discount over cash and according to the RAC, they make public transport almost two and a half times cheaper than driving a car to work. Good luck.

a. Smoke from domestic wood stoves is a major source of photochemical smog problems.
   True  False

b. Using public transport, bikes, walking or teleworking can reduce traffic congestion.
   True  False

c. Photochemical smog problems are most severe in summer.
   True  False

Name:  Day time contact phone number:

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Department of Environmental Protection
Westralia Square
141 St Georges Terrace
Perth WA 6000

TravelSmart Workplace supports Transperth's TravelSmart program.
Message from the Chief Executive Officer

Perth is a great place to live. Blue skies, clean ocean, beautiful beaches and a standard of living which many Australians can only dream about.

I'm sure I'm not alone in wanting to keep Perth the way it is! Unfortunately, the rapid growth and development of Perth has not occurred without some problems. Two problems which we all face are decreasing air quality and increasing traffic congestion. In response to growing scientific evidence and community concern about air quality, and its connection with transport issues, TravelSmart Workplace has been developed to help address these problems.

TravelSmart Workplace aims to raise awareness and understanding of air pollution issues and the transport choices which Western Australians face. TravelSmart Workplace consists of a series of newsletters, information pamphlets and a poster display which is regularly updated within participating Perth workplaces by a team of volunteers. The TravelSmart Workplace team has also been conducting a number of lunchtime forums which promote awareness about the choices available to all of us when deciding how best to travel to work.

We should all be proud of our commitment to ensure that Perth's air quality is protected. I urge you all to keep an eye out for the remaining TravelSmart information and activities over the next few months.

Dr Bryan Jenkins
Chief Executive Officer
Department of Environmental Protection

Who is Involved???

TravelSmart Workplace is run by the Department of Environmental Protection, but the partnership approach to this program means many other groups are involved.

Participating workplaces for 2000 include Woodside, City of Perth, Health Department, OveArup and Partners, and Family & Children's Services. The combined number of employees for all these workplaces comes to approximately 2000. Imagine what a difference it would make if this number of people reduced their daily vehicle emissions!

Supporting organisations involved in providing materials, prizes, guest speakers and valuable information for the TravelSmart Workplace program include the Conservation Council, the Heart Foundation, Bikewest, Transperth, Transport and the RAC. Keep an eye out for what they have to offer!

There are also eight trained volunteers from Murdoch University acting as TravelSmart workplace facilitators. Over the last few months you may have noticed a stranger in your workplace. Someone wearing a smile and a TravelSmart T-shirt. That would be your member of the TravelSmart team, available to help your workplace develop better use of alternative transport.

Editorial

Welcome to TravelSmart Workplace News! If you have not already heard what this is all about, then hopefully this newsletter will answer most of your questions.

In this issue, read about the TravelSmart Workplace program, its purpose, those involved, and some facts about Perth's air quality.

Also peruse some information about transport alternatives to the single occupant vehicle.

Happy travelling - and remember - its how you get there that counts!
What is Photochemical Smog?

Photochemical smog is an often invisible cloud of air pollution composed mainly of the highly corrosive gas ozone (O3). While ozone in the upper atmosphere protects us from the sun's harmful ultra violet rays, high ozone levels at ground level can lead to respiratory problems, and in some cases repeated exposure can be fatal.

Photochemical smog in Perth is formed when oxides of nitrogen and reactive organic compounds (ROC's) are carried over the ocean and are "cooked" in high summer temperatures. The afternoon sea breeze then carries the plume of photochemical smog back over the metropolitan area. The Perth Photochemical Smog Study indicated that in Perth, cars contributed more than half of the emissions which create photochemical smog (see figures). Industry sources are responsible for only 19 per cent of reactive organic compounds, and 44 per cent of nitrogen oxides, far less than the levels produced by cars.

You can make a difference!

In order to overcome the growing photochemical smog and traffic congestion problems now being experienced in Perth, TravelSmart Workplace is aiming to reduce drive alone car trips by 10 per cent. TravelSmart Workplace is asking you to reduce your driver only car trips by just two per week.

Two trips per week may not seem a lot, but in fact, two car trips per week adds up to eight trips per month, 100 trips per year or almost 10 per cent of the average 1,000 car trips taken per year by each individual driver.

If you want to make a difference to the quality of the environment in Perth, one of the biggest steps you can take is to reduce your reliance on the car for some of your travel needs. By making more use of a TravelSmart Workplace alternative (such as public transport) for some of your trips to work, you will be making a positive contribution to a cleaner environment. You can make a difference - it really is that simple.

Cycling on the web

There are many cycling sites on the web, try the ones below and follow the links to a wholesome new world!

Cyber Cyclery  www.cyclery.com  Bicycle Industry Australia  www.bikeoz.com
Become a cycling role model

Without getting too technical, TravelSmart Workplace follows a 'social diffusion model' of behaviour change. Social diffusion is all about how new and innovative ideas, behaviours or technologies move through a society. As an example, think for a minute about personal computers - a few years ago, hardly anyone owned a personal computer but now they are commonplace. The process by which computers went from being a rarity to being commonplace is how social diffusion works.

Getting more people to ride bikes to work involves a similar process. Like a few years ago, when only a small number of innovative people had home computers, today, only the most innovative people are cycling. There is no doubt that if you're regularly cycling to work now, you are at the cutting edge of changes taking place in our society. Our task at TravelSmart Workplace is to 'speed up' this diffusion process and you can definitely play a part.

Your role as a cycling role model is invaluable in promoting cycling to other commuters. With your help, we will see more and more people take up cycling. Here’s a list of things you can do:

- be a cycling 'ambassador' - talk to colleagues who drive about the benefits of cycling
- join a cycling organisation and become active in cycling issues - help to raise the cycling profile
- feel good about yourself and enjoy your cycling!

You are making a difference!

Cycling 100 Project

A project aimed at encouraging commuters to get out of their cars and onto their bikes has exceeded all expectations.

Participants in the Cycling 100 project have not only experienced significant health benefits, but have also been responsible for the reduction of greenhouse gas emissions by 37 tonnes over a period of 12 months.

Environment Minister Cheryl Edwardes said by providing an incentive as small as a new bicycle and positive support, Cycling 100 participants look set to change their commuter habits for good.

"The Department of Environmental Protection (DEP) and Bikewest's Cycling 100 project set out to determine how drivers could be motivated to change their commuter behaviour and choose alternative transport methods," Mrs Edwardes said.

"Twelve months later, the switch from cars to bikes has been enthusiastically embraced by each participant, with target kilometres being exceeded by an average of 25 per cent and health tests showing remarkable improvements."

Most notably, health tests conducted by the University of Western Australia (UWA) on each volunteer found that the four short bicycle rides each week had reduced elevated cholesterol levels by half.

"Each of the initial 57 volunteers, aged between 21 and 65, gained significant improvements in the efficiency of their lungs, heart and circulatory system."

"Additional positive findings were a reduction in the risk of heart attack and stroke, and improvements in lower back flexibility."

The project also highlighted the potential to reduce greenhouse gas emissions and improve Perth's air quality.

Participants cycled an average of 181 kilometres per month compared to their target of 145 kilometres per month.

An average sized Australian car travelling the total number of kilometres travelled by project participants over the 12 months would produce 37 tonnes of greenhouse gas emissions.

Mrs Edwardes said the project provided an encouraging outlook on future efforts to reduce the number of cars on the road.

"With the Cycling 100 project demonstrating the willingness of drivers to change their commuter habits, the Government is now better placed to implement programs that will be well received by the community," she said.

Bicycles for each participant were provided through project sponsors, which included Transport WA, the Department of Training and Employment, UWA, Bikewest and private employers.

Sponsors are now being sought to continue the project in 2000 with a further 250 participants.

Cycling 100 participants John Bedford (PricewaterhouseCoppers) and Helen Grey (University of Western Australia).
Walking Works

Most of us are unaware as we head off for a walk that we will be using more than half the muscles in our bodies. Even walking at a leisurely pace makes the muscles of the hips, buttocks, thighs, calves, ankles and feet simultaneously contract and relax.

Regular walking leaves your muscles in better shape and makes you feel good. As muscles go into action, their requirement for oxygen increases. Consequently, the heart and lungs have to work harder by stepping up the speed at which the blood circulates around the body.

Brisk walking is an aerobic exercise which, when sustained for about 20 minutes does just this. It increases the speed at which kilojoules are used up. Vigorous walking refreshes the mind. When you are tense, certain muscles, especially those in the back contract.

One of the best aspects of walking is that anyone can do it, no matter how unused to exercise they are.

Always wear a pair of supportive shoes with wedge heels and loose, comfortable clothes which do not restrict your movement.

Don’t drive when you can easily walk

Walking is accessible, low cost, self-managed and requires minimal organisation and equipment.

- Your body will love you for it and you’ll benefit from having regular effective work outs.
- You will save money on petrol or bus / train / taxi fares. Buy yourself something more exciting than petrol.
- You’ll help the environment by reducing fuel emissions.
- By avoiding the peak hour rush, you’ll have more chance of being less stressed.
- Walking to work makes it easy to establish a fitness routine.
- It gives you an opportunity to appreciate the environment.
- We live in Perth - the climate is great.
- Cars pollute the external environment; walking improves your internal environment.
- You will feel more confident, happy and relaxed.
- It’s a natural and safe body action, and
- It generates a positive mental attitude.
Outsmart the Sweat - Lose the Layers

When walking to work, sweat is one of the natural occurrences undesired by many. The clothing you wear is the key to reducing it. During summer lycra bike shorts with a light t-shirt are ideal moisture munchers. In the colder months, layer up with comfortable clothes that keep you warm and dry don’t let you get hot. Still allow ventilation and protection from the wind with your clothing.

Don’t start without the right shoes

All purpose athletic shoes or running shoes are built for comfort, support and fit. They compensate for walking on hard, unforgiving surfaces such as concrete and asphalt. Choose shoes designed for specific sports. Don’t wear tennis or basketball shoes when going walking. Corns and calluses are caused by friction and pressure on the feet, most often from incorrectly fitting shoes. Comfortable shoes are the best prevention. Shoes with shock absorbing soles will reduce the impact on your feet.

Breathe Easy!

Taking a deep breath more often can be invigorating and cleansing. If our incoming breath is loaded with life giving oxygen, our outgoing breath carries with it a cargo of wastes. Walking helps improve breathing without making you feel ‘puffed out’.

Traffic congestion in Perth

Current figures indicate that 65% of Perth’s 85,000 city based workers commute to work by car and that 90% of these commuters drive to work on their own. That is over 50,000 people. These single occupant trips are a highly inefficient way of moving around the city. This is especially true in terms of time and money lost when people are sitting in traffic jams, the waste of non-renewable fossil fuels, additional pollution and impacts on the health of all of us including increased stress resulting from increasing traffic volumes.

You may not be convinced that Perth is experiencing traffic congestion problems but the current rate of growth indicates the number of cars on Perth’s roads is set to double from 694,000 to more than 1.3 million in the next 32 years. The total number of kilometres driven in Perth is also set to increase from 25.8 million today to 59.3 million by 2029!

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The average (Australian) car dumps about 4.3 tonnes of carbon dioxide into the atmosphere in one year.

Every litre of petrol saved reduces greenhouse emissions by 2.5kg.

Safety facts

The number of car drivers and passengers killed on WA roads has increased by nine per cent over the past five years, and was 108 drivers and 65 passengers for 1999 alone.

Public transport is the safest way of getting around Perth. No Transperth or Westrail passengers have been killed while using public transport.

In 1995, there were 37,287 road accidents reported to the WA Police Service. Of the serious accidents, 64 per cent occurred during daylight hours, 80 per cent occurred in dry weather conditions, and 71.5 per cent occurred on a week day.

The annual cost of road crashes to the WA community exceeds $2 billion dollars. This is a ‘hidden’ cost of car travel.

Besides the usual running costs of a car such as fuel and parking, every person in WA contributes more than $1,200 each year to the costs associated with accidents on the roads. Hospital costs associated with vehicle accidents cost the WA community a further $281 million each year.
Save your money!  
Save your time!  
Save your planet!  
Carpool!

If four people travelled in one car instead of using four separate vehicles, we could eliminate 75% of the car trips made to work each day. Every litre of petrol you use produces more than two kilos of carbon dioxide, the main Greenhouse gas. If you carpooled for just one day a week for a year, for a 30 km round journey to work, you could reduce carbon dioxide emissions by 350 kilos.

Carpooling can be flexible, it can be organised every day or just one day each week - depending on your needs. Whatever the case, car pooling is worth a try!!

The Department of Transport has calculated that for a return trip of 40 kilometres (five days per week for a year), car pooling can save motorists between $600 and $900 in fuel costs depending on the size of the car. Carpoolers can also save over $300 per year in parking costs. The City of Perth currently provides discount prices for carpoolers in two of its city car parks.

Better still, if you're able to sell your second car by car pooling, you could actually reduce your transport bill by up to $10,000 per year. Just think of how you could use the savings - holidays, home renovations, investments!

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**Helpful Hints for Carpooling**

- Some employees have found it helpful to set up an emergency transport system so car pooling staff know they will always be able to get home if they are working late, the driver has gone offsite or there is an emergency.
- Arrange a contract with a local taxi or a car hire firm so that cars are always available.
- Seek out priority parking for car poolers where parking space is at a premium.
- Place a message in your internal newsletter or other administration system promoting car pooling.
- Set up a network which can give people a chance to meet other staff who live in their area and help arrange lifts. Perhaps identify one member of staff who can act as the co-ordinator.
- Establish the understanding that your carpool serves one purpose only - commuting to and from work - avoid personal detours for shopping and errands.
- Promote car pooling events such as a car pooling day for charity, car pooling coffee club etc.
- Work out a schedule for who drives when and plan out cost sharing for petrol, parking and vehicle maintenance.

Discuss everyone's preferences for radio stations, smoking policy, morning and evening leaving times and routes.

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**How Much Is Your Car Costing You?**

Did you know the National Roads and Motoring Association (NRMA) has estimated personal vehicle costs for new to 10 year old cars?

This table shows average weekly and yearly average estimates for selected cars that are new to ten years old.

These figures are based on an average distance travelled of 40km/day, an average fuel price of 75.8 cents per litre and vehicle maintenance costs (servicing and a range of replacement parts expected to be replaced for time and distance factors).


### Vehicle running costs.

<table>
<thead>
<tr>
<th>Vehicle</th>
<th>Average (per week)</th>
<th>Average (per year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Toyota Starlet 1.5</td>
<td>$86.82</td>
<td>$4514.64</td>
</tr>
<tr>
<td>Mitsubishi Mirage 1.5</td>
<td>$87.44</td>
<td>$4546.88</td>
</tr>
<tr>
<td>Holden Vectra 2.0</td>
<td>$106.82</td>
<td>$5554.64</td>
</tr>
<tr>
<td>Toyota Camry 2.2</td>
<td>$114.23</td>
<td>$5939.96</td>
</tr>
<tr>
<td>Mitsubishi Magna V6</td>
<td>$116.83</td>
<td>$6075.16</td>
</tr>
<tr>
<td>Toyota Conquest 3.8</td>
<td>$122.68</td>
<td>$6379.36</td>
</tr>
<tr>
<td>Holden Commodore 3.8</td>
<td>$123.32</td>
<td>$6412.64</td>
</tr>
<tr>
<td>Ford Falcon 4.0</td>
<td>$125.15</td>
<td>$6507.80</td>
</tr>
<tr>
<td>Honda Accord 2.2</td>
<td>$155.41</td>
<td>$8081.32</td>
</tr>
</tbody>
</table>
True Story....

Could this be you?

Earlier this year the TravelSmart Workplace team fielded some enquiries about public transport services in some Perth suburbs. Most of these enquiries were answered with very positive results.

In one case an employee who lives about 20km south of Perth wanted to know if there were any bus services to Perth in their area. We were able to use the Transperth journey planning service on the internet to discover that an express bus left approximately 500m from their house, taking only 15 minutes to get into the heart of the city, quite close to the workplace.

Since that time the employee has not needed to drive to work, and since they work everyday that means there will be about 250 less car trips into Perth in the next year.

For every person that can leave their car outside the city - our air quality is improved. The more people who make 250 less trips a year, the greater the improvement.

So What exactly is TravelSmart?

Is TravelSmart about forcing me out of my car?

No! The TravelSmart program aims to provide you with information about transport options and current air quality and traffic congestion issues so that you can make an informed decision about the way you travel to work. For some people, alternatives to the car may be cheaper and faster than driving to work, while for others the car may be the only option available. TravelSmart promotes the idea that alternatives to the car such as walking, cycling, public transport, carpooling and teleworking are options for some people, some of the time, and every choice makes a difference. TravelSmart creates a link between the transport choices of individuals and the social and environmental impacts of pollution and congestion.

What's in it for me?

TravelSmart has benefits for people concerned about environmental and social issues as well as financial and health advantages. You may also find that trips to work become more convenient and enjoyable. At a community wide level, you will help improve air quality and reduce traffic congestion; problems which affect everyone's lifestyle.

What is the background?

The Department of Transport (DoT) and Department of Environmental Protection (DEP) have been monitoring transport growth and investigating the links between traffic congestion and air quality standards. The Perth Photochemical Smog Study (DEP, 1996) indicated that Ozone (highly corrosive gas, main component of photochemical smog) levels in Perth have been increasing steadily for a number of years. The study also indicated that vehicles are the main source of emissions that form Perth's photochemical smog.

TravelSmart Workplace was trialed in 1997 with excellent results. Ten per cent of participants changed from using single occupant vehicles to an alternative for commuting to work. This may seem a small change to some people - but it actually has a significant positive impact on Perth's air quality. If we can continue to increase our use of alternative transport for commuting, then we can significantly reduce air pollution.

What's the link between my transport choice and photochemical smog problems?

Department of Transport data indicates that over 90 per cent of the 55,000 vehicles that come into the Perth CBD each day for work carry a single occupant. That means that 49,500 people drive to and from work in Perth every day on their own! The emissions from these trips are the single biggest contributor to Perth's declining air quality.

Small changes by a large number of people can have huge outcomes in terms of urban air quality and traffic congestion. If commuters change from driving, to walking or catching the bus on one day every week they reduce their contribution to emissions by 20 per cent. Commuters who are unable to alter their single occupancy car transport methods can also do their part by having the car regularly serviced and tuned. Every little bit helps. Simple, relatively painless change now will avoid the need for complex, and expensive change in the future.

Ultimately, air quality and congestion are issues that concern everyone.
Survey results

In January this year we surveyed around 2000 people in five large organisations in the Perth CBD. We had a reasonable response to the survey, receiving nearly 700 questionnaires.

There was a large variation between workplaces in the percentage of driver only car trips, ranging from 62% of trips in one workplace to only 24% in another. The breakdown of transport modes for the whole sample is shown in the figure below. Check your TravelSmart Display to see how your workplace compares...

Knowledge of air quality and transport issues was not too bad with 51% of all responses being correct, but nearly 30% of responses were marked ‘don’t know’, and for some questions concerning causes of photochemical smog up to 57% of responses were incorrect.

Answers to recent questions:

Kryptonite bike locks are available from the UWA Sports Centre for $77.71. These are all but unbreakable as written in the July 2000 edition of ‘bicycling’ magazine.

All Buses are free within the city Central Business District, the trains are also free from City West to Clareebrook.

Cheaper parking for Car Pooling is available in: Elder St for $2 per day between 6.30 and 9am; Car park 13 Goderich St for $2 per day between 6.30 and 9am; and Mayfair St West Perth 7 – 8.30am.

Concerns or queries can be referred to City of Perth GPO Box c120 Perth 6839.

Bus Bikeracks are at the very preliminary stages of assessment. They are a long way off but are being considered as options. Letters expressing an interest can be sent to Transport, 441 Murray St Perth 6000.

25.8 million vehicle kilometres are travelled in metropolitan Perth each day.

RAC vehicle emission tests are free at least until September.

Transperth Information line 13 62 13 www.transperth.wa.gov.au

$28 week pay increase on offer

Imagine that for five days each week, you drive a typical small to medium 1.5L car like a Toyota Starlet () to and from work over the Perth average commute distance of 20 kilometres. According to the NRMA, the weekly driving costs (fuel, tyres, servicing, etc) but not including ownership costs (such as insurance, interest repayments and depreciation) of running a Corolla for work purposes amounts to $22.28 per week (11.14 cents per kilometre). When you add the $25 average weekly parking costs to the running costs, it shows that driving even a small car into the city is going to cost at least $47 each week. In comparison, a person who uses a two zone Multirider Plus for the same trip to work spends only $18.75 to get to and from work each week. What could you do with the extra $28.50 which regular train and bus passengers are already saving? If you sell your second car and start to use public transport for the easy trip to work in the CBD, you could save even more money!

MORE INFORMATION

The TravelSmart Workplace team always love to hear from you and should you have any inquiries or comments please feel free to call Catherine Baudains, TravelSmart Coordinator, on 9222 7191 or e-mail at catherine_baudains@environ.wa.gov.au or get in touch with the volunteer in your workplace. There is also a comments/ suggestions/ questions box attached to your TravelSmart Workplace display which is checked on a weekly basis.

Contact:
Catherine Baudains
TravelSmart Coordinator
Phone: 08 9222 7191 Fax: 93221598
Email: catherine_baudains@environ.wa.gov.au
Perth's Air Pollution, What Can We Do?

We now know that the major source of emissions that form photochemical smog in Perth is motor vehicles. To reduce smog levels we do not have to sell our cars or keep them locked up in our garages. If we follow some of this advice then we can, collectively, make a difference:

- Use your car less - consider taking public transport, walking, cycling or car pooling whenever you can. Start with alternative transport for just one or two of your trips per fortnight / week. You will save money while keeping our air clean;
- Reduce your number of trips such as shopping, taking the children to school, going to the gym or visiting friends on one roundtrip;
- Keep your car well maintained - it will produce up to 25 percent fewer emissions than poorly maintained cars. Keep your tyres properly inflated to reduce resistance, and don't "hot up" your car with non standard extras;
- Drive your car smoothly - avoid hard braking and excessive acceleration;
- When you are next buying a new or second hand car, consider a smaller, more efficient car - they save you money and produce fewer harmful emissions;
- Consider converting your car to liquid petroleum gas (LPG) - it produces less emissions and also saves you money!!

You could win a FREE MOUNTAINBIKE!!

There will soon be another opportunity to win a FREE bike. It is just as simple as it was last time, all you have to do is complete the next Travelsmart survey which will be sent out to you in September and return it to the Department of Environmental Protection, or at your TravelSmart Breakfast.

Editorial

Fuel prices are soaring and Perth's air quality is suffering from too many single occupant vehicles on our roads. Inside are some positive suggestions which can help you to save money, help improve the environment and reduce traffic congestion. Improving Perth's air quality requires each individual to make small positive changes in their transport behaviour. Feel good about you transport decisions and tell your friends.

This second issue of TravelSmart Workplace News 2000 tries to answer some of the questions you have asked over the last few months. Your participation in this program has been greatly appreciated; and if you receive a survey in the next month or two we thank you in advance for returning it - and good luck in the draw for the bikes! We hope TravelSmart Workplace has been as helpful to you as you have been to us!

Remember - try green transport, it might be easier than you think, and...it's how you get there that counts!
Green Transport Plans for Perth

Staff from the five participating workplaces including the City of Perth, Family and Children Services, Health Department and Woodside have become more aware of the problems caused by single occupant vehicle commuters. These workplaces are helping to counteract air pollution and traffic congestion by constructing Green Transport Plans with help from the TravelSmart Workplace 2000 Program run by the Department of Environmental Protection and the Conservation Council WA.

The Green Transport Plan's address trips made by employees, with an emphasis on avoiding unnecessary driver only car trips, encouraging the use and overcoming barriers to greener modes of travel, review current transport practices, recommend actions for reducing vehicle use and discusses the management and monitoring of actions.

Rationale

Over three quarter of the trips made by people in the Perth metropolitan area are made by car and many of these cars have only one driver in them. Travel patterns increasingly dominated by car trips are not environmentally, socially or economically sustainable. Impacts include the following:

- declining air quality, with vehicle emissions being a major source of air pollutants, (DEP 1997);
- high per capita greenhouse gas emissions, (Transport 2000);
- traffic in local, especially inner suburban neighbourhoods, (Transport 2000);
- loss of public areas to road building.
- traffic accidents and related costs, (WA Police 1999).

As trip generators, workplaces contribute to this situation and can play a role in managing transport impacts by greening travel choices.

What is Photochemical Smog?

Photochemical smog is an often invisible cloud of air pollution composed mainly of the highly corrosive gas ozone (O3). While ozone in the upper atmosphere protects us from the sun's harmful ultra violet rays, high ozone levels at ground level can lead to respiratory and cardiovascular problems.

Photochemical smog in Perth is formed when oxides of nitrogen and reactive organic compounds (ROC's) are carried over the ocean and are "cooked" in high summer temperatures.

The afternoon sea breeze then carries the plume of photochemical smog back over the metropolitan area.

The Perth Photochemical Smog Study indicated that in Perth, cars contributed more than half of the emissions which create photochemical smog (see figures). Industry sources are responsible for only 19 per cent of reactive organic compounds, and 44per cent of nitrogen oxides, far less than the levels produced by cars.

Perth is not yet suffering acute photochemical smog problems, but last summer ozone levels exceeded World Health Organisation (WHO) standards 11 times. As Perth continues to grow and the number of cars on the road increases so will photochemical smog levels. To reverse this trend we must reduce our car use and use alternatives whenever we can.

OZONE PERTH REGION
1-HOUR MONTHLY MAXIMUM

The graph shows the monthly peak of one-hour average of ozone concentrations across the Perth metropolitan area. It shows the seasonal fluctuation of ozone levels, with the highest levels occurring during summer months. The continuing exceedances of the ozone air quality guideline are of concern.
It's nearly Springtime! Time to spring into action!

If you live within a reasonable cycling distance of your workplace (anywhere from five minutes up to an hours ride is a good measure) then cycling might be for you. The Travelsmart survey indicated that at least 476 people participating in the trial lived within a half an hours cycle of the Perth CBD. Many other people live within cycling distance of train stations, bus stops or park 'n' ride facilities. The potential for people to start cycling for at least a part of their journey to or from work is huge. The contribution which switching to cycling (rather than driving the car), can make to reducing photochemical smog and congestion is also enormous. Here's a few tips to get you started.

✵ If you haven't taken regular exercise for a long time, then it might be a good idea to get a check-up from your GP. Your doctor will be able to recommend a healthy exercise program, but in general, cycling is one of the safest forms of exercise.

✵ Build up your exercise gradually. Try to lift your pace or increase the trip distance as your fitness level improves.

✵ If you are keen to cycle part of the trip or even the whole distance to work, try to plan ahead. Make a 'dry run' by cycling your route on a weekend and time how long it takes. Try to carry everything which you would normally take to work. That way you'll know if your bag will be too heavy!

✵ Try to drink 500ml of water half an hour before the start of your ride. In hot conditions try to drink small amounts of water as you go.

✵ Wear a cycle helmet and sun screen (especially if riding in the middle of the day). Light coloured clothing may also be sensible if you are cycling at night. Very small and bright flashing lights are also available from bike shops for around $20. They make you visible to traffic on even the darkest of nights.

✵ Cycling is not particularly strenuous but some people may prefer to shower and change when they arrive at work. If this suits you, then check out your office shower facilities.

✵ Cycle with a friend, colleague or partner. Cycling is good fun and sharing the trip means you can catch up on 'quality time' with someone you like! Having a cycling buddy can help with motivation (if the trip by car starts to look inviting).

✵ Try to stick to quiet side streets away from busy roads and use pathways through parks and other natural areas as much as possible. Try to vary your route so you remain interested in your surroundings. The 'get back to nature' feeling can be wonderful first thing in the morning!

✵ Enjoy yourself and relax. Cycling is one of the best ways to 'de-stress' and you'll soon wonder why you'd been missing out on life by driving your car!

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Benefits of Cycling

Cycling benefits me because:

- improves my muscle, respiratory and cardiovascular development,
- contributes to my weight loss,
- reduces my stress levels
- and improves my mental health.

If I ride instead of driving I will:

- reduce greenhouse gas emissions
- increase the health of the community
- reduce noise pollution
- reduce road congestion

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Bike Maps!

New Perth Bike maps are available for purchase from the RAC, bike shops, newsagents and some book shops. These maps present invaluable information about cycling routes and road riding conditions to help you plan your ride to work.

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Question of the month

When and where are the police bike sales held (where unclaimed bikes are sold to the public)?

Held at Smith Broughton Auctions, 1 Clayton St Midland.
Auctions are held once a month.
The next one will be held on September 30 and then November 11, 2000.

Contact Smith Broughton Auctions (ph: 9274 6717) for more details or dates.
For cleaner lungs

Alternative transport 2x a day

Many people today are concerned about the environment, and deteriorating air quality. If you want to show your concern bare in mind that actions speak louder than words!

One solution to the problems of declining air quality and increasing traffic congestion is to catch the bus or train a lot more! Leaving the car in the garage for trips which you could use public transport has many personal and community benefits.

- Using public transport can save you money. Besides saving on the usual running costs of a car, you'll also save on parking costs in the city. In fact, the RAC believes that using public transport to get to work is two and a half times cheaper than driving a car. Just think what you could do with all the spare cash which you presently spend just getting to work!

- Using public transport can help reduce your stress levels - you can read, catch up on some paper work, have a nap or share a conversation.

- Many public transport routes to the city are now fast and direct - you need never waste time stuck in traffic jams again!

- Public transport is the safest way of getting about the city. No Transperth passengers have ever been killed when using public transport to get to work. Car accidents caused 223 deaths and 12,220 casualties in 1998.

- Less car trips mean lower pollution levels and less congestion. Less congestion and less pollution benefits everybody.

- Using public transport shows a genuine concern for the environment.

Get more movement while going to work!

The dangers of a sedentary life have become alarmingly clear. Here are some hints to help you out.

- Get out of the car - where possible go part of the way to work by car, park and walk the remaining distance to work. Or stop the bus one or two stops before the usual stop and walk that little bit further to work.

- Walk whenever you can - piling up short periods of activity is good for you too. So take moving coffee breaks or lunchtime walks.

- Turn off e-mail - communicating by computer is sure to keep you in your chair all day. Walk over and talk to your co-workers face to face.

- Forget the lift - take the stairs if you only have a few levels to go up. They are often next to the escalators or the lift.
Frequently Asked Questions

During the TravelSmart Workplace program many issues and concerns have been raised by participants. We approached Transperth and received these answers for you:

Buying a ticket.
- Tickets can be purchased from bus drivers or from ticket machines on railway stations and ferry terminals.
- Buying a 40 trip or 10 trip Multirider saves you 25% and 10% respectively. These can be bought from Newspower newsagents, Perth Central train station or the Busport.
- Your bike can travel FREE with you on the trains on weekends.

Bus Security
- All buses have 4 video cameras fitted and can be used to prosecute vandals who damage the system.
- After 7.30pm, providing it is safe, a bus can drop you anywhere along its route, sometimes even at your doorstep, making travel for you more convenient and safe. Just ask the driver.

Train Security
- After 7pm every train has a special constable aboard who has the same powers as the police.
- The emergency button by the door can be used to talk to the driver about any matter which concerns you, for example you have left your groceries on the last platform.

Other Services provided by Transperth
There are many new and improved services which Transperth now offers such as the CircleRoute which links major universities, shopping centres, hospitals and retirement homes. Transperth is constantly updating and trying to improve it's service to meet the needs of it's patrons so feel free to use the infoline 13 62 13 or the internet www.transperth.wa.gov.au to plan your journey. Also send your comments to Transperth’s Comment Line on 13 16 08.

South Perth Buses enjoying a roaring trade

South Perth has been home to an ‘individualised marketing TravelSmart campaign’ which has succeeded in increasing bus patronage by 22% at the same time as the rest of Perth has seen only a 1% increase. Benefits will include improving Perth’s declining air quality while also benefiting people’s health by simple daily exercise such as walking to the bus stop.

Werner Brog, managing director of Socialdata contacted and surveyed over 15,000 South Perth households. 670 households already using green modes of travel were rewarded with small gifts of TravelSmart mugs, books and notepads and then left alone, 6900 households were unresponsive or not able to be reached and were not contacted further. The 8000 households which were left received information and incentives to help them make the change to public transport.

The TravelSmart program has been so successful in it’s goal of improving Perth’s air quality that the program is due to be extended throughout half of Perth’s metropolitan area in Transport’s ten year Metropolitan Transport Plan. TravelSmart’s target is to reduce car use by 25% in 10 years using this individualised marketing campaign, local council action plans and school programs.
Carpooling car parks

NEWSFLASH!! The Carpooling Carparks in the City have changed!! Now they are located at Mayfair St West Perth and at the Queens Gardens Carpark East Perth on the corner of Plain St and Wellington St. The cost for carpooling cars is $2.50 / day. Presently there are up to 200 DISCOUNT bays available which are not being used for car pooling.

There is a CAT service which runs every 5 minutes all day from Hay St, near Mayfair carpark and along Wellington St near the Queens Garden Carpark. These buses take you quickly to the centre of Perth. Why not try it?

Helpful Hints for Carpooling

- some employees have found it helpful to set up an emergency transport system so that carpooling staff know they will always be able to get home if they are working late, the driver has gone offsite or there is an emergency. Such a system can have a contract with a local taxi or a car hire firm so that cars are always available;
- priority parking for car - poolers where parking space is at a premium;
- set up a network which can give people a chance to meet other staff who live in the area and help to arrange lifts;
- identify one member of staff who can act as the coordinator;
- place a message in your internal newsletter or other administration system for promoting car pooling;
- promote car pooling events such as a car pooling day for charity, car pooling coffee club etc;
- establish the understanding that your carpool serves one purpose only - commuting to and from work - avoid personal detours for shopping and errands;
- establish a weekly or monthly rate or re-imbursement for the driver;
- work out a schedule for who drives and when;
- plan out cost sharing for petrol, parking and vehicle maintenance;
- discuss everyone's preferences for radio stations, smoking policy, morning and evening leaving times and routes;
- investigate that insurance is adequate for all participants.

Advantages of Carpooling

Carpooling doesn't reduce air pollution as much as cycling or walking -- a vehicle still travels from your neighbourhood to your workplace. You can still get stuck in traffic, and you may cause more congestion in your area compared to a bus, but...

...There are still economic, environmental and social advantages!

<table>
<thead>
<tr>
<th>ECONOMIC</th>
<th>SOCIAL</th>
<th>ENVIRONMENTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saves you money on service and repairs.</td>
<td>Maintain luxuries of driving in a variety of cars.</td>
<td>Reduces levels of harmful emissions entering atmosphere such as greenhouse gases, carbon monoxide and photochemical smog.</td>
</tr>
<tr>
<td>Decreases the need for more roads, bridges and tunnels.</td>
<td>Easily organised with other workers.</td>
<td>Less parking space is required, providing for more space for street cafes and trees.</td>
</tr>
<tr>
<td>Saves your money on fuel costs.</td>
<td>Provides increased security to and from work.</td>
<td>Reduces the number of cars on the road.</td>
</tr>
<tr>
<td>Discount parking prices are available for those who carpool to the city.</td>
<td>Very flexible programs.</td>
<td></td>
</tr>
<tr>
<td>Saves you money on parking fees.</td>
<td>Reduces amount of stress caused from driving.</td>
<td></td>
</tr>
<tr>
<td>Decreases the traffic congestion into work.</td>
<td>Less car accidents and injuries.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Provides an opportunity for socialising while travelling.</td>
<td></td>
</tr>
</tbody>
</table>
Halve the cost of arriving at work!!

An employee at East Perth Government Offices (EPGO) has calculated the cost difference between driving his car which runs on gas and using public transport for a one month period.

<table>
<thead>
<tr>
<th>Single Occupant Vehicle (Gas)</th>
<th>Cost ($)</th>
<th>Public Transport (2 zone)</th>
<th>Cost ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parking (4 weeks)</td>
<td>70</td>
<td>40 Trip Multirider</td>
<td>75</td>
</tr>
<tr>
<td>Fuel – Gas- (4 weeks)</td>
<td>80</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>150</td>
<td></td>
<td>75</td>
</tr>
</tbody>
</table>

This shows that even without costs such as registration, wear and tear on your car and servicing etc it is TWICE AS EXPENSIVE TO DRIVE YOUR CAR THAN TO USE PUBLIC TRANSPORT!!

You will also gain more exercise, (10 minutes of exercise per day reduces the risk of heart attacks by 50%), the trip will be less stressful and you will have time to read on your way to work.

With the constant improvements being made to the public transport system it could be WORTH your while examining potential options. Call the friendly Transperth Infoline operators on 13 62 13 for details of cost, time and bus numbers from your area.

These figures where based on a car which runs cheaply on gas. Imagine the savings for your car which runs on petrol?

Alternative Transport – Quicker and Cheaper than you think!

Table 1.1 shows details for a 10km (each way) commute to work and home during peak hours, ie 7.30 – 9am.

<table>
<thead>
<tr>
<th>Rego, insurance, road service (cents)</th>
<th>Fuel (cents)</th>
<th>Tyres, service and repairs (cents)</th>
<th>Parking (cents)</th>
<th>Ticket ($)</th>
<th>Time taken (mins)</th>
<th>Pollution CO2, (kg)</th>
<th>Total Costs ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Holden Vectra 2.2L</td>
<td>178.6</td>
<td>182.6</td>
<td>111.6</td>
<td>500</td>
<td>0</td>
<td>20 - 40</td>
<td>2.4</td>
</tr>
<tr>
<td>Bus</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>3.76</td>
<td>10 - 40</td>
<td>0.13</td>
<td>3.76</td>
</tr>
<tr>
<td>Train</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>3.76</td>
<td>15</td>
<td>&gt;0.13</td>
<td>3.76</td>
</tr>
<tr>
<td>Bike</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>30 – 50</td>
<td>0</td>
<td>0.1</td>
</tr>
<tr>
<td>Walk</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>120</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Tickets prices are based on an adult multirider (40) trips with 25% discount.
Cycling is based on 1 cent per km for repairs and maintenance.
Fuel is based on 92 cents per litre.
Time taken for the cars and bus depend on which road is being used. The bus can be far faster than using a car if it is using a bus lane, Mitchell Freeway for example.

Look for benefits to YOU : financial, health, social and environmental. You can make a difference.
TRANSPORT INFORMATION

Express train services run from Joondalup in 22 mins, Fremantle in 23 mins, Midland in 22 mins and Armadale takes 34 mins to reach Perth.

Express bus services cater to the needs of commuters. High Frequency buses run from Rockingham to Fremantle every 7 or 8 minutes in the morning and evening and take under an hour.

Murdoch Park n Ride buses allow you to park free and buses arrive every 5 minutes and arrive in Perth 12 minutes later. There is a security guard and cameras monitoring the car park. Some cycling enclosures are also available.

Success Park n Ride also allows you to park free and has buses running straight into the City every 15 minutes during peak times.

Transperth’s friendly Information Line Operators will give you complete details of your travel plans including best routes, time of departure and arrival, cost and anything else you require. Try them today, 13 62 13.

Transperth’s Journey Planning can also be done on the Web at www.transperth.wa.gov.au

The Bureau of Transport Economics have estimated the cost of road crashes at $15 billion and this can be reduced by encouraging alternatives to the motor car.

TravelSmart Crossword #1

1 A Percentage of vehicles commuting to Perth carrying a single occupant.  
2 A High levels of ozone at ground level cause what sort of health problems  
3 A Travel daily to and from work in a City  
4 A Bus, train and ferry are what sort of transport in Perth  
5 A Main component of photochemical smog  
6 A Season when photochemical smog mainly occurs  
7 A Main source of emissions leading to photochemical smog in Perth  
8 A Abbreviation of organisation running TravelSmart Workplace  
9 A Pedestrian transport - good for the heart  
10 D Commuting with more than one passenger in a car is to ......  
11 D Air pollution effects people of all ......  
12 D To move an object or person from one place to another  
13 D Percentage of reactive organic compounds from industrial sources  
14 D Photochemical

Want some more info about alternative transport?

This year Travelsmart Workplace has been a part of your workplace – and it is nearly time to say Goodbye. The positive contribution you have made to the quality of life in Perth is greatly appreciated and we hope you will continue to help make a difference.

Who to contact:

Cycling:
Bikewest
Ph : 9320 9320

Bicycle Transportation Alliance
Ph : 9420 7210
Web : www.sunsite.anu.edu.au/wa/bta

Walking:
Heart Foundation WA
Ph : 9388 3343
Web : www.heartfoundation.com.au

Ministry of Sport and Recreation
Ph : 9387 9700

Public Transport:
Transperth
Ph : 13 62 13
Web : www.transperth.wa.gov.au

Other:
DEP TravelSmart
Ph : 9222 7001
Web : www.environ.wa.gov.au

Transport
Ph : Jackie Richmond – 9320 9589
Web : www.transport.wa.gov.au

DEP Community Support Branch
Ph : Greg Allen 9222 7001
Web : www.environ.wa.gov.au

Travelsmart Workplace coordinator
Ph : Catherine Baudains 9360 6394

Thank You

Department of Environmental Protection
Westralia Square
141 St Georges Terrace
Perth WA 6000
TravelSmart in Communities
Transport works with local government to develop local solutions to the high level of car use. The community is actively encouraged to be involved in developing and implementing the solutions.

TravelSmart to Major Destinations
A lot of people work at or visit major destinations such as hospitals or tertiary institutions, and most arrive by car. Transport works with organisations to develop and promote the use of sustainable transport.

TravelSmart to School
Designed for Years 5 to 7, this 10 week curriculum-based program which culminates in a TravelSmart to School week and a ‘Magical Mystery Tour’, includes a resource kit and teacher support.

To get involved in any of these programs contact Transport.

For more information about TravelSmart contact:
Bruce James or Gary John
Transport
Telephone: 9320 9320
e-mail: gjohn@transport.wa.gov.au
www.travelsmart.transport.wa.gov.au

TravelSmart Workplace
Catherine Baudains
Department of Environmental Protection
Telephone: 9222 7000
e-mail: catherine_baudains@environ.wa.gov.au

Other contacts:
Conservation Council WA
Smogbusters
David Wake
Telephone: 9220 0658

Bikewest
Jim Krynen
Telephone: 9320 9320

Transperth
Infoline: 13 62 13
TTY 9485 0485
www.transport.wa.gov.au

Heart Foundation
Telephone: 9388 3343
What’s The Problem?
Perth has a very high and increasing level of car use. In fact, there are over two million car trips made per day. These car trips make up 63% of all non-commercial trips. By 2029 this number will rise dramatically to over 4.5 million trips if current trends continue unchecked.

Traffic congestion is an increasing problem, and vehicle emissions are the single biggest contributor to Perth’s declining air quality.

Simply continuing to expand the road network on its own is not environmentally, socially or economically sustainable. The Metropolitan Transport Strategy (MTS) (Transport WA, 1995) identified ways to achieve a more ‘balanced’ Transport system including: improving public transport services; improving the environment for walking and cycling; changing land use patterns, and; changing people’s own transport choices. The MTS targets for changing travel patterns are shown in the figure below.

What Can Individuals Do?
Improved air quality and reduced traffic congestion can be achieved by everyone making small changes in the way they travel. Going by foot, bicycle, bus or train for even one trip a week makes an enormous difference. Here are some simple steps:
1. Think about which trips you could change.
2. Find out how to change them using the contacts overleaf.
3. Try the change when you’re not in a rush.

TravelSmart Can Help
TravelSmart is the name of transport awareness initiatives run by Transport and the Department of Environmental Protection.

TravelSmart aims to change people’s travel habits and encourages them to walk, cycle, bus, train or carpool. TravelSmart agencies conduct a number of programs to start people thinking about their travel choices. These include:
- TravelSmart Workplace;
- Individualised marketing for house holds;
- TravelSmart action plans for local areas;
- Action plans for trip generators (places that many people need to travel to); and
- TravelSmart to School.

TravelSmart Workplace
Aims to reduce the number of single occupant vehicle trips into the Perth central area in order to improve air quality and reduce traffic congestion.

This program focuses on commuters and involves a free 26-week information campaign designed to raise awareness and encourage use of transport alternatives. As well as improving air quality, the program can improve the general health and efficiency of employees.

TravelSmart Workplace guides for carpooling, walking, cycling, and using public transport are available.

To get your workplace involved contact the Department of Environmental Protection.

There are many advantages to using your car less.
You can:
- save money;
- improve your health;
- develop a sense of community; and
- enjoy travelling in different ways.

The community benefits include:
- better air quality;
- better local living environment;
- support for local business; and
- less traffic congestion.
How to Start Walking

1. Start gradually and build up to your goals. Learn some stretching exercises for warming up and cooling down.

2. First build up to walking on most days of the week, then aim to walk for 30 minutes each day. As you get fitter, you can walk faster - but don't overdo it and set yourself back!

3. Work out the shortest walking distance from your home to your workplace (remember the shortcuts through parks and other natural areas). If it is 5km or less, try walking it on a weekend to see how long it takes you.

4. Walk with a friend, colleague or partner. Sharing the walk is enjoyable and can help with motivation.

5. Carry a water bottle.

6. Vary how many times you walk to fit your schedule. If you are busy with other commitments, only walk two or three times a week, at other times you can walk more often.

7. Walking does not have to be strenuous, but if you prefer to shower and change when you get to work, check out your office facilities.

8. Take the time to relax and enjoy your environment. Walking to work can really help you get the most out of life.

Try walking. It might be easier than you think!

For more information about TravelSmart Workplace initiatives and other alternative transport options, contact:

Catherine Baudains
TravelSmart Workplace Co-ordinator
Department of Environmental Protection
4th Floor
Wesralia Square
141 St Georges Terrace
PERTH WA 6000

Telephone: (08) 9476 7423
Fax: (08) 9322 2850
E-mail: catherine_baudains@environ.wa.gov.au

Other TravelSmart Workplace Guides Available:

- Cycling
- Carpooling
- Public Transport
- Teleworking

Join the clean team
Walking Works

A TravelSmart Workplace Guide to Walking

TRAVELSMART. It's how you get there that counts.
You can make a difference!

Reducing greenhouse gases, reducing Perth's photochemical smog, reducing traffic congestion, improving health and satisfaction. All these are within your reach... if you can walk to work.

In Australia, cars are a major source of greenhouse gases, generating more than 60 million tonnes of carbon dioxide each year. Walking is non-polluting and easy.

If you live within a reasonable walking distance of your workplace (anywhere from five minutes to an hour's walk is a good measure) then you could walk to work.

In Perth there are over 17,000 commuters who live within 5km from their workplace. Even if each of these people only walked to work two days every week, Perth's air quality problems would be significantly reduced.

What can you do?

If you are one of the thousands of people who are able to walk to work in Perth, you could reap the benefits of improved health and save the hundreds of dollars you would normally spend on petrol, parking and vehicle maintenance each year.

Not only that but you would be making a positive contribution to developing a more sustainable community - protecting our future.

Why walk?

The physical activity required for walking has many benefits. Those outlined by the Ministry of Sport and Recreation include:

**Health Benefits**
- improved cardiovascular fitness;
- greatly reduced risk of heart disease and stroke;
- reduced risk of developing diabetes;
- improved blood pressure and cholesterol;
- improved muscle strength, joint movement, flexibility and balance;
- improved strength and fitness and a lower risk of osteoporosis;
- reduction in excess body fat and improved body tone; and
- protection against arthritis.

**Other Benefits**
- improved self-confidence;
- improved quality and ease of sleep;
- improved balance, gait and coordination;
- improved posture and appearance; and
- enhanced mental health.

How much is enough?

The Heart Foundation of Australia recommends a total of at least 30 minutes of moderate physical activity, such as walking, on most days of the week. This can be achieved in two 15 minute sessions if it is more convenient.

Walk at an enjoyable pace, which increases your heart rate but you can still keep up for about 30 minutes. Walking too slowly (window shopping pace) will not challenge your body sufficiently and the benefits will be less.

See the difference

When you start walking take note of your body measurements, how you felt and how far you could walk. Find out your heart rate and blood pressure too if you want to. Record your improvements or the goals you achieve so that if you 'don't feel like walking' you can have a look at your record to help motivate you.

Be flexible

It's fine to miss a few days sometimes, everyone does, but remember its always harder to get back into a habit than to break one. Remind yourself of all the good work you have done, and remember that a short walk is better than no walk.

Want to get involved?

There are many community groups, activities, professional and government agencies which deal with walking. Many of these can provide information on health, planning your walk, community events, and other useful information concerning walking as a physical activity.

You can get more information about these from the Ministry of Sport and Recreation or the Heart Foundation, contact details below.

Ministry of Sport and Recreation
Sir Thomas Mitchell Pavilion
Meadow Bank, Perry Lakes, FLOREAT.
Ph: 9387 9700
Fax: 9387 9726

National Heart Foundation of Australia
Western Australian Division
334 Roeby Road
SUBLICO.
Ph: 9388 3343
Fax: 9388 3383
How to start cycling

Here are a few tips to get your cycling program started.

1. Plan ahead - try out your cycling trip to work on a weekend and time how long it takes you. Get a copy of a bike map to help identify the best route to take.

2. On your “test ride”, carry everything you would normally take to work. That will help you to know if your bag will be too heavy.

3. Build up your exercise gradually. Lift your pace or increase trip distance as your fitness level improves.

4. Try to drink 500ml of water half an hour before the start of your ride. In hot conditions try to drink small amounts of water as you go.

5. Wear a cycle helmet, sun screen, and if cycling at night light coloured clothing is sensible. Bicycle lights are available from bike shops for around $20.

6. Cycling does not have to be strenuous, but if you prefer to shower and change when you arrive at work check out your office shower facilities.

7. Cycle with a friend, colleague or partner. Cycling is fun and sharing the trip is even better! Having a cycling buddy can help with motivation if the trip by car starts to look inviting.

8. Vary your route to keep your surroundings interesting. Include quiet side streets and pathways through parks and other natural areas in your trip. The ‘get back to nature’ feeling can be wonderful first thing in the morning.

9. Enjoy yourself and relax. Cycling is one of the best ways to ‘de-stress’ and you’ll soon wonder why you’d been missing out on life by driving your car!

Try cycling - it might be easier than you think!

For more information about TravelSmart Workplace initiatives and other alternative transport options, contact:

Catherine Baudains
TravelSmart Workplace Co-ordinator
Department of Environmental Protection
4th Floor
Westralia Square
141 St Georges Terrace
PERTH WA 6000

Telephone: (08) 9476 7422
Fax: (08) 9322 2850
E-mail: catherine_baudains@environ.wa.gov.au

Other TravelSmart Workplace Guides Available:

- Cycling
- Walking
- Public Transport
- Teleworking

Join the clean team
It makes sense to cycle

A TravelSmart Workplace Guide to Cycling

TRAVELSMART
It's how you get there that counts
You can make a difference!
Reducing greenhouse gases, photochemical smog, traffic congestion and improving health and satisfaction. All these are within your reach...
If you are within reach of a bicycle.
Did you know that cycling is one of the most energy efficient, inexpensive and environmentally friendly modes of transport?

Powerful from renewable rather than fossil fuel energy, a bicycle covers a 16km urban commuting trip in less time than a car. The fuel cost is about 350 calories (the energy it takes is a bowl of rice) compared to 18,600 calories for a car.

In Australia cars are a major source of greenhouse gases, generating more than 60 million tonnes of carbon dioxide each year. Bicycles are non-polluting as they produce no greenhouse gases.

If you live within a reasonable cycling distance of your workplace (anywhere from five minutes to an hour ride is a good measure) then you could cycle to work. In Perth there are a large number of commuters who live within an ideal cycling distance to work. In fact nearly 90,000 people who work in Perth live only 10km or less away, that's only half an hour ride! Even if each of these people only cycled to work on two days every week, Perth's air quality problems would be significantly reduced.

We all win
If you are one of the thousands of people who are able to cycle to work in Perth, you could reap the benefits of improved health and save the hundreds of dollars you would normally spend on petrol, parking and vehicle maintenance each year. Not only that but you would be making a positive contribution to developing a more sustainable community and protecting our future.

Why ride?

Feel better
Many people who cycle to work say they feel much happier, more refreshed and ready for the day ahead when they ride.

More efficient
The bike can be an efficient substitute for commuting around the metropolitan area. Cycling trips are often not much slower than car trips – and sometimes can be quicker.

Keep fit
Your health and fitness can be increased significantly just by riding your bike – and it doesn’t cost anything extra. Cycling for as little as one hour each week can reduce the risk of heart attack by 50.

Save the environment
Cycling reduces pollution and the use of fossil fuels so the environmental benefits in many ways.

Community spirit
Many people have explained that by cycling you can develop a better understanding of your local community, and feel like part of it.

Information about cycling
There are many sources of information about cycling. Your first stop should probably be Bikewest. Bikewest is a small unit within the Department of Transport dedicated to promoting safety and encouraging wider use of bicycles. Amongst other tasks, it plays a vital role in developing the cycling facilities you use.

Bikewest has produced a series of bike maps showing cycling routes throughout the metropolitan area, as well as a comprehensive series of brochures about almost every aspect of cycling, including: Bikes on trains; Bicycle lockers at railway stations; Buying a bicycle; Cycling - basic maintenance; Cycling in comfort; Cycling in the wet; Cycling to work, and; Cycling for health and fitness. These brochures are available through bicycle retailers or by contacting Bikewest.

Other groups of interest include:
WA Police (Bicycle and Bike-Ed Sections)
(08) 9222 1777, (08) 9227 6727
Bicycle Transportation Alliance
(08) 9470 4007
Cyclist Action Group
(08) 9384 7409
WA Cycling Federation
(08) 9361 2229
Department of Transport
(08) 9320 9320

Many cycling groups exist which are not listed here; you can contact your local council to find out what is available in your area or contact the Bicycle Transport Alliance.
How to start using public transport

1. Gather information about the services around your home and near your workplace. This is available at the city bus stations, by phone (13 62 13) or on the internet (www.transperth.wa.gov.au).

2. Try an Experiment: On a weekday when your not in a hurry, try out one of the services that take you to Perth.

3. Work out the most efficient route. This might mean using a ‘Park n Ride’ facility if you are short on time.

4. If you can afford it buy a 40 trip multi-rider - you save 25% on your fare!

5. Travel with a friend, colleague or partner. Sharing the trip is enjoyable and can help with motivation.

6. Use the time to take a nap, read or just enjoy the scenery. If you enjoy reading take a good book. You will soon find yourself looking forward to your daily reading time to and from work!

7. If you have commitments which require your car on some days, use public transport on the days when you do not need it. Every trip counts.

8. Take the time to relax and enjoy your environment. Every time you use an alternative to the car you are contributing to its welfare.

Try Public Transport.
It might be easier than you think!

For more information about TravelSmart Workplace initiatives and other alternative transport options, contact:

Catherine Baudains
TravelSmart Workplace Co-ordinator

Department of Environmental Protection
4th Floor
Wesralia Square
141 St Georges Terrace
PERTH WA 6000

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E-mail: catherine_baudains@environ.wa.gov.au

Other TravelSmart Workplace Guides Available:

- Cycling
- Carpooling
- Walking
- Teleworking

Join the clean team

A TravelSmart Workplace Guide to Public Transport

TRAVELSMART. It's how you get there that counts.
Car addiction

In recent decades, our community has become increasingly automobile dependent. Most of us use cars to travel everywhere. Our suburbs are designed around vehicles and transport alternatives are reduced.

However, recent research challenges the assumption that automobile travel is necessarily good for an economy or society. In fact, beyond a certain level, automobile dependency may impose more costs than benefits!

Did you know?

- In Australia, cars are a major source of greenhouse gases, generating more than 60 million tones of carbon dioxide each year.
- Motor vehicle traffic accidents were responsible for 1943 deaths in 1996.
- Internationally, only New Zealand, America, and Italy have a higher percentage of deaths caused by traffic accidents.
- No Transperth passengers have ever been killed when using public transport to get to work!

What can you do?

If you are one of the thousands of people who have access to public transport services in Perth, you could save the hundreds of dollars you would normally spend on petrol, parking and vehicle maintenance each year.

Moreover, you would be making a positive contribution to developing a more sustainable community - protecting our future.

You can make a difference!

Using the public transport system is a very environmentally friendly way to travel. It offers a cleaner, more sustainable and far safer alternative to private motor vehicles. All the Transperth trains run on electricity and some buses have been converted to run on natural gas.

The Transperth System, managed by Transport, consists of bus, ferry and train services and information. The many bus service areas are serviced by different operators:

**Perth Bus (Claremont/Belmont)**
Telephone 9475 0066

**Southern Coast Transit (Cockburn, Fremantle, Rockingham)**
Telephone 9592 8185

**Swan Transit (Armadale South, Canning, Kalamunda, Midland, Southern River)**
Telephone 9274 7400

**Path Transit (Joondalup North, Marmion, Morley, Wanneroo)**
Telephone 9246 9866

**Fares (Standard Adult Cash Fares)**

- 2 sections $1.00
- 2 zones $2.50
- 4 zones $4.00
- 6 zones $5.50
- 1 zone $1.70
- 3 zones $3.30
- 5 zones $4.80
- 7 zones $6.30

Buying multi-rider fastcards reduces the cost of your fare. For a 10 trip multi-rider you get a 15% discount, and for a 40 trip multi-rider you get a 25% discount. For a map showing details of the fare zones go to the “zone map” under ‘tickets and fares’ on the Transperth web site (www.transperth.wa.gov.au).

Planning your journey

There are a few ways you can get information about public transport services and times to help you plan your trips. You can call the info line or visit info centres, or you can try the Transperth web site which offers information on many aspects of the public transport service, as well as an online journey planner. Type in where you are and where you want to go and the planner can help you find the best way to get there.

Details for all these services are listed below.

- Info Centres: City Buaport, Perth Train Station, Plaza Arcade, and Wellington Street bus station.
- Website: www.transperth.wa.gov.au

Be flexible

It's fine to miss a few days sometimes, everyone does, but remember it's always harder to get back into a habit than to break one. Remind yourself of the benefits to you and the environment.

Check out all the possibilities

Some areas have buses which cover a lot of ground on the way to Perth. If time is a factor in your choice have a look in nearby areas for a direct bus route or train into the city and drive to it. It is still far better (and cheaper) to only drive part of the way to work and avoid the peak hour emissions, than to drive in every day. ‘Park and Ride’ facilities are designed specifically for this use and usually provide free parking for people catching the bus or train.
How to start car pooling

Car pooling is easy. It takes only some basic organisation and sensible co-operation. Because participation is voluntary it’s easy for everyone to help car pooling succeed. Car pooling is a team effort and the biggest key to success is that punctuality counts! Here are some tips to get you started:

1. **Let everyone know** that you’re interested in car pooling and list suburbs you pass through;
2. Once you find people who live along your route to work, decide how you will **share responsibility** for driving. You may drive to their house and they drive from there or vice-versa, or you may take turns picking each other up;
3. **Swap phone numbers** in case unexpected events change your plans the night before. Remember to notify all the other ‘poolers’ the night before if you can’t make it;
4. Decide how **fuel and parking costs will be shared** - then you’ll all save $$$;
5. Only allow a ‘**smoking**’ policy if all members are in favour; and
6. **Learn to relax** and enjoy the trips when you’re a passenger - have a chat, take a nap, read a book or catch up on work - the choice is yours. Remember that co-operation and tolerance will help your car pool to run smoothly.

Try Carpooling - It might be easier than you think!

For more information about TravelSmart initiatives and other alternative transport options, contact:

Catherine Baudains  
TravelSmart Workplace Co-ordinator  
Department of Environmental Protection  
4th Floor  
Westralia Square  
141 St Georges Terrace  
PERTH WA 6000

Telephone: (08) 9476 7422  
Fax: (08) 9322 2850  
E-mail: catherine_baudains@environ.wa.gov.au

Other TravelSmart Guides Available:

- [Cycling](#)  
- [Walking](#)  
- [Public Transport](#)  
- [Teleworking](#)

Join the clean team

**Save your Money!**  
**Save your Time!**  
**Save your Planet!**

Carpool

A TravelSmart Guide to Car Pooling

TRAVELSMART  
It's how you get there that counts
You can make a difference!

Perth is experiencing growing pains. Our air quality is decreasing and traffic congestion is getting worse. The cars that we all drive are the main cause of both problems.

If you look around you next time you are travelling to work, you will notice that most cars only have one person in them. In fact about 50,000 cars travel to and from Perth’s central business district each day with only the driver in them. Do you travel alone?

If you and lots of other commuters were to car pool with friends or work colleagues there would be fewer cars on the road.

What can you do?

For many commuters car pooling is both practical and possible. Car pooling can be a great way to get to work, especially if you are able to travel with family friends or work colleagues. Think of the social advantages!

Car pooling is using one person’s car to carry one or more passengers. The best thing about car pooling is that it’s easy to organise and flexible to run. Car pooling can be organised every day or just one day each week - depending on your needs. Every effort you make helps.

Savings For You and the Environment

Did you know the National Roads Motorising Association (NRMA) has estimated personal vehicle costs for new to 10 year old cars to be:

<table>
<thead>
<tr>
<th>Vehicle</th>
<th>Average (week)</th>
<th>Average (year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Toyota Starlet 1.5</td>
<td>$86.82</td>
<td>$4514.64</td>
</tr>
<tr>
<td>Mitsubishi Mirage 1.5</td>
<td>$87.44</td>
<td>$4546.88</td>
</tr>
<tr>
<td>Holden Vectra 2.0</td>
<td>$106.82</td>
<td>$5554.64</td>
</tr>
<tr>
<td>Toyota Camry 2.2</td>
<td>$114.23</td>
<td>$5939.96</td>
</tr>
<tr>
<td>Mitsubishi Magna V6</td>
<td>$116.83</td>
<td>$6075.16</td>
</tr>
<tr>
<td>Toyota Conquest 3.8</td>
<td>$122.68</td>
<td>$6379.36</td>
</tr>
<tr>
<td>Holden Commodore 3.8</td>
<td>$123.32</td>
<td>$6412.64</td>
</tr>
<tr>
<td>Ford Falcon 4.0</td>
<td>$125.15</td>
<td>$6507.80</td>
</tr>
<tr>
<td>Honda Accord 2.2</td>
<td>$155.41</td>
<td>$8081.32</td>
</tr>
</tbody>
</table>

Figures based on average of 40km/day, average fuel price of 75.8 cents per litre and a range of replacement parts expected to be replaced for time and distance factors.

Benefits of car pooling

So even if you only carpool once a week there are great benefits. Here are just a few:

- reduce your current transport costs (by up to 75 percent) by sharing the burden with other car poolers;
- car pooling reduces the number of vehicles on the roads, and can also reduce the need for road maintenance and clear-up congestion;
- car pooling with others shows a genuine concern for the environment;
- car pooling can help reduce your stress levels - you can read, catch-up on some paper work, have a nap or share a conversation on the way to work; and
- car pooling is just as quick and convenient as driving on your own.

Is insurance a problem?

As long as car pooling is for the mutual convenience of participants and not for direct profit, there are no problems.

You can use one person’s car and share expenses, or rotate vehicles on a weekly basis depending on your needs. There are no insurance problems either as passengers are covered by compulsory third party insurance, and your own vehicle is your own insurance responsibility.