AN EXPLORATION OF DRIVERS FOR THE PERFORMANCE OF ENVIRONMENTALLY PREFERRED BEHAVIOURS

Naomi Castelan
BA, BSc(Hons)

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Abstract

The current research project examined drivers for the performance of Environmentally Preferred Behaviours (EPB), and a rigorous and accessible theoretical framework for drivers of this category of behaviours was created. Factors that influence the performance of EPBs, as well as some initial models of drivers for these types of behaviours, were identified from the literature. Three studies were subsequently conducted. Study 1 involved gathering the previously unexplored knowledge regarding drivers for EPB performance held by practitioners in the field using qualitative interviews with 19 participants. This information was then combined with that from the literature to create an original proposed model of the predictors for EPB performance. Study 2 involved creating a questionnaire to test the proposed model, and Study 3 used this questionnaire to test the proposed model with 503 office-based employees from Melbourne, Australia, focusing on two paper saving behaviours. Results from Study 3 were used to refine the proposed model to create the B-ECO Model. This model forms the basis for the B-ECO Theory which states that habit, convenience, procedural information, social norms, leadership, nature experience and self-efficacy are direct influences on EPB performance, and that they work in conjunction with environmental knowledge, connection to the environment and self-transcendence which affect behaviour indirectly through attitudes. Further, the B-ECO Theory states that these factors interact to produce an EPB, and that some factors are more influential than others. This theory differs from previously used psychological theories by including a range of contextual factors that have been identified individually. Further, it specifies the factors that may be influential predictors for the particular type of behaviours classified as EPBs. Further research is required to test the B-ECO Model with a range of behaviours in a range of physical and temporal contexts to examine its universal relevance to different EPBs, or otherwise.
Declaration of authorship

This thesis contains no material which has been accepted for the award of any other degree or diploma at any university or equivalent institution and that, to the best my knowledge and belief, this thesis contains no material previously published or written by another person, except where due reference is made in the text of the thesis.

Signed:

Naomi Castelan

Dated:

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Chapter 1

Introduction and literature review

1.1 Introduction

The world is currently facing unprecedented environmental crises. The alarming effects of climate change have been the dominant global concern over the past decade (eg. Flannery, 2005; IPCC, 2013). There are also many other environmental catastrophes occurring concurrently. As far back as 1992, a document entitled ‘World Scientists’ Warning to Humanity’ outlining environmental crises including those of water, soil, forests, biodiversity and overpopulation was signed by more than 16,000 senior scientists from around the world, and half of all Nobel prize winners (Suzuki & McConnell, 1997).

The main causes of these environmental crises appear to be rooted in destructive human behaviours (Oskamp, 2000a, 2000b; Stern, 1992; Stern & Oskamp, 1987). Thus, changes in human behaviour are vital if the natural environment is to be protected (Barr, 2007; McKenzie Mohr, 2000b; McKenzie-Mohr & Smith, 1999; Oskamp, 1995a, 2000a; Stern, 1992).

An understanding of the drivers behind behaviours that are environmentally destructive or protective is crucial for developing policy and educational programs which aim to foster more sustainable behaviours (McKenzie-Mohr, 2000a, 2000b; Tracy & Oskamp, 1983/84). The discipline of psychology has a major role to play in developing this type of understanding as it is primarily concerned with human behaviour and its motivation (Maloney & Ward, 1973; McKenzie-Mohr, 2000b; Vlek, 2000). Psychology, therefore, has a responsibility to apply acquired knowledge and scientifically developed theories to this important field (Oskamp, 2000a, 2000b; McKenzie-Mohr, 2000b; Stern, 1992; Winter, 1996). The current research contributes to this aim by exploring drivers for the performance of Environmentally Preferred Behaviours (EPBs) using frameworks developed within the discipline of psychology.
1.1.1 Definition of ‘Environmentally Preferred Behaviour’ (EPB)

The term ‘Environmentally Preferred Behaviour’ (EPB) is broadly defined for the purposes of this manuscript after Stern (2000) as any behaviour which has a positive or a less negative *impact* on the natural environment, whether or not it was intentional, or any behaviour in which the actor’s *intention* was to have a positive or less negative impact on the natural environment, whether or not the impact ensues. An enormous range of behaviours can be included in this definition. Behaviours which fit the definition will vary according to updates in scientific understanding about the natural environment.

1.1.2 Introduction to the literature review

The body of literature concerning drivers for the performance of EPBs is just over four decades old and has evolved notably over that time. Although there was some exploration of the drivers for energy saving behaviours throughout the 1970s in response to the US oil crisis (eg. Pallak & Cummings, 1976; Seligman et al., 1979; Winett, Neale, Williams, Yokley & Kauder, 1978/79) there was a relative dearth of research in this field through the 1980s. As scientific and lay awareness of human-caused environmental problems increased throughout the 1990s a rigorous, research-based literature on the drivers to perform behaviours which could exacerbate or alleviate these crises developed (eg. Gamba & Oskamp, 1994; Schultz & Zelezny, 1998; Stern, Dietz & Kalof, 1993) with a heavy emphasis on recycling behaviours. Since 2000, there has been further exploration of psychological constructs in relation to EPBs (eg. Barr, 2007). The body of literature is continuing to expand.

Research in this field has been chiefly exploratory, and has thus been largely atheoretical. A majority of studies have examined collections of factors which have been hypothesized to motivate particular EPBs, without the guidance of theoretical frameworks. Owens, Dickerson and Macintosh (2000), for example, examined the simple relationships between a range of demographic variables and household recycling. Sporadically, psychological theories have been used, notably The Theory of Reasoned Action (Ajzen & Fishbein, 1980), The Theory of Planned Behaviour (Ajzen, 1991), Schwartz’s Value Theories (Schwartz, 1977, 1994) and isolated studies using the Theory of Interpersonal Behaviour (Triandis, 1977, 1980, cited in Bamberg & Schmidt, 2003). The concepts of locus of control and cognitive
dissonance have also been used, but these have been to explain findings rather than to guide research. Subjective utility models, which assume behaviour is based on a thorough weighing of pros and cons, have been used to anticipate environmental behaviours but have been found to have insufficient predictive power (Thogerson, 1996). One notable exception is provided by Stern and colleagues who have combined a number of theories to create an effective model of psychological constructs for explaining EPBs (Stern, Dietz, Abel, Guagnano & Kalof, 1999).

While arising from the psychological domain which largely focuses on internal psychological processes, research in this field is beginning to investigate the effect of specific contextual differences on EPB performance, rather than simply acknowledging that the context may play a role in behavioural choices. The important influence of contextual variables is highlighted by the fact that EPB performance may not be consistent across settings. In a study conducted in the US, for example, Goal-Framing Theory (Lindenberg & Steg, 2007 cited in Miao & Wei, 2013) was used as a guide to examine the effect of types of motives (normative, hedonic, gain, constraints to motives) on the performance a range of typical household EPBs (eg. turn off tap when brushing teeth, change towels daily). The study found that normative (personal and social) motives were a strong predictor of household EPB performance, but that when using hotels, hedonic motives emerged more strongly for individuals (Miao & Wei, 2013).

As this area of research has largely lacked theoretical guidance, the literature review is not organized according to theoretical themes. It rather examines findings relating to individual predictive factors. This organization is somewhat artificial because studies rarely examined single factors in isolation, and also factors likely interact with one another, but it allows an examination of the contribution of each factor to EPB performance. A review of the small amount of research examining interactions of factors appears at the end of this chapter, as well as some comments regarding interactions being contained within the reviews of select predictive factors.

The literature on EPBs can be roughly divided into two groups. The first is concerned with factors that influence the performance of EPBs, such as ‘social norms’. The second is concerned with interventions that are designed to increase the frequency of EPB performance, such as providing signage to prompt office staff to switch off their computer screens when they leave work. The current thesis is concerned with factors only. Studies evaluating interventions are not included in the
literature review except where they provide information which contributes to the understanding of the motivating mechanisms of a factor. For example, a study which examines the effect of supplying residential homes with easy-to-use recycling infrastructure on rates of curbside recycling (an intervention) also provides information about the role of ‘convenience’ (a factor).

The focus on factors was chosen because a comprehensive understanding of factors may be a more useful tool to improve the effectiveness of interventions than evaluations of single interventions. Theory that arises out of such an investigation may provide a broad base of information from which professionals can draw when creating a varied range of interventions.

An additional distinction has been made between previous research that examines the precursors to environmental behaviour and that which examines the precursors to environmental attitudes. Attitudes are considered in the current research in terms of their role of in predicting EPB performance, rather than on what predicts the attitudes themselves. This is consistent with the broad aim of the research being on investigating the drivers for the performance of EPBs, rather than on thoughts about the environment.

As EPB research is a developing field of study, constructs have not yet been well-defined. This has led to researchers using a variety of labels to describe identical constructs. For instance, the terms ‘attitudes’ and ‘beliefs’ have both been used to describe a construct that is defined here as ‘attitudes’. Findings of these studies have thus been grouped together here under the heading ‘attitudes’.

Conversely, varying definitions exist in the literature for constructs with similar or identical labels. For instance, the term ‘environmental concern’ has been used to describe a cognitive construct labelled here as ‘attitudes’, but also to describe an affective construct labelled here as ‘an emotional connection to the environment’. Research findings have been allocated to the section in the literature review which is the most similar to the definition used in the thesis.
1.2 Factors which may influence the performance of EPBs

A review of the literature on factors which have been examined regarding their relationship to EPB performance follows. Factors can be divided into contextual factors, those which act on individuals from an external source, and psychological factors, those factors which reside within an individual’s psyche. The first six factors described here can be classified as contextual (convenience, social norms, leadership, nature experience, demographics and cultural context), and the remaining 10 as psychological (attitudes, values, environmental knowledge, procedural knowledge, self-efficacy, connection to the environment, past behaviour, personal responsibility, intrinsic motivation and identity). The sections on attitudes and values are significantly longer and more detailed than those of the other factors, reflecting the much larger and more complex body of literature that exists for these factors.

1.2.1 Convenience

Convenience is defined in the current manuscript as *anything that renders a behaviour convenient, or more convenient, to perform*. Examples of convenient events include having appropriate infrastructure close by, or the behaviour being easy. This factor has been divided into sub-factors of ‘ease’, ‘comfort’, ‘expense’ and ‘physical infrastructure’. A small number of studies which did not define convenience specifically have been included in an additional section labelled ‘General convenience’. A note on the interaction between convenience and other factors is also included.

i) Ease

The ease of performing a behaviour appears to impact on whether or not it will be performed, as well as how often it will be performed. Most studies examining this sub-factor have investigated household recycling.

The provision of a council curbside pickup service for household recyclables, rather than individuals being required to deliver them to a recycling drop-off centre, has repeatedly been found to correspond significantly with higher recycling rates (Derksen & Gartrell, 1993; Guagnano, Stern & Dietz, 1995; Vining & Ebreo, 1992). In addition, having the curbside collection of recyclables on the same day as the general rubbish collection increases recycling compared to having the recycling
collection on a separate day (review by Porter, Leeming & Dwyer, 1995). A co-
mingled system (that is, putting all recyclables in one bin rather than a more
complicated system in which individuals are required to separate different recyclable
materials into separate bins) has also been associated with higher rates of recycling
(Gamba & Oskamp, 1994; Oskamp, 1995b). A review by Schultz, Oskamp and
Mainieri (1995), however, concluded that results were unclear regarding the effect of
needing to separate recyclables.

The proximity of drop-off points for recycling services appears to have an effect on
recycling behaviour. In a study of US college dorm residents, for instance, Witmer
and Geller (1976) found that the volumes of paper delivered for recycling were
greatest from those whose room was near the paper collection point.

The perception of the difficulty of recycling has also been found to predict curbside
conducted a study with US householders in an area that had been provided with a
curbside collection program for over 10 years. After directly observing whether or not
householders put recyclable materials on the curb for a monthly pickup at least once
during a three month observation period, householders were contacted and asked if
they would take part in a study. Those classified as recyclers did not differ from
those classified as non-recyclers in their pro-recycling attitudes or their belief in the
importance of extrinsic motivations to recycle. They differed only in their perceived
difficulty of recycling as measured by items such as 'It's a big nuisance to keep
everything separated for recycling'.

The finding regarding ease has been repeated in non-recycling studies. Too much
effort required for conservation weakly predicted energy use in a study by Seligman
et al. (1979). Siegfried, Tedeschi and Cann (1982) found that few college students
engaged in EPBs that required effort outside the home. Easy EPBs were performed
more often than difficult EPBs, regardless of levels of self-determination, in a study
by Green-Demers, Pelletier and Menard (1997) and beliefs about the difficulty of
performing EPBs was found to be a significant predictor of their performance by
ii) Comfort
Comfort levels are another important element of convenience. This is most salient in the study of energy use (review by Olsen, 1981), particularly related to the heating and cooling of homes (review in Winkler & Winett, 1982). Ritchie, McDougall and Claxton (1981) found that there was greater in-house energy consumption on colder days, and Winett, Kaiser and Haberkorn (1976/77) found that an effective intervention to reduce household energy use (feedback to householders) was less effective on warm days when air conditioners were in use. Seligman et al. (1979) conducted two studies in the USA in which they used questionnaires and utility readings with householders. They found that beliefs regarding comfort and health significantly predicted energy consumption (which was mainly used for air-conditioning) during summer.

In addition, the perceived comfort of driving to university by German students predicted car use, as measured by their assessments of whether it would be quick, comfortable, without stress and flexible (Bamberg & Schmidt, 2003).

iii) Expense
At times, expense has been found to impact on EPB performance. Bachman and Katzev (1982), for example, found that providing unlimited free bus tickets to car drivers increased their bus ridership significantly, and Lindsay and Strathman (1997) found that perceived costs of recycling prevented recycling behaviour. Further, Pitts and Wittenbach (1981) found that home energy costs were the largest consideration in the decision to insulate one’s home.

Despite the intuitive assumption that higher prices would lead to a reduction in purchases of various commodities, however, this appears to be rarely the case. Stern, Black and Elworth (1983) found that oil price increases did affect one energy EPB, being low-cost structural improvements to the home for increased energy efficiency, but the majority of studies have found that price increases for energy do not reduce energy use within the home (Aronson, 1990) or car use (Pitts, Willenborg & Sherrell, 1981; Willenborg & Pitts, 1977).

In relation to petrol use, a longitudinal study using questionnaires during the US oil crisis found that price increases for gasoline generally did not discourage driving, except for the very poor (Pitts et al., 1981). There was more change when price increases were sudden and large, but people adapted quickly. Another study
conducted during the US oil crisis examining petrol use found that despite price increases, the number of miles driven and number of cars owned actually increased (Willenborg & Pitts, 1977). There was some trend to smaller vehicles, indicating an unwillingness to give up driving. There were slight decreases during periods of serious shortage and large price increases, but they were very modest compared to the size of the price increase.

One explanation offered for people choosing to spend more on energy, rather than reduce its use when it becomes expensive may be related to other types of convenience, for example, maintaining comfortable temperatures inside the home (Stern et al, 1983).

More recent studies have found that introducing a charge for plastic bags increases the use of reusable shopping bags by consumers and there is a corresponding reduction in the consumption of single-use plastic bags. This finding has been replicated in a number of cities around the world including Wales (Poortinga, Whitmarsh & Suffolk, 2013) and Buenos Aires in Argentina (Jakovcevic et al., 2014). Jakovcevic et al. (2014) found that six months after the introduction of a charge for single-use plastic shopping bags consumers reported that the primary reason they brought their own shopping bags was to protect the environment, indicating the development of an intrinsic motivation to perform this EPB, rather than being motivated by the extrinsic driver of financial cost. This finding is interesting as it highlights the interaction between cost, a contextual variable, and the reported concern for the environment, a personal variable. The authors suggest that it is possible that consumers initial concern for the environment was not sufficient to drive a change in their behaviour and that the charge for single-use bags was well received due to the background good will and readiness to change behaviour. Subsequently, the small cost applied to the plastic bags drove the change in behaviour, which then further strengthened a favourable attitude.

iv) Infrastructure

The presence of infrastructure to facilitate EPB performance, and the characteristics of that infrastructure, have been found to have a strong impact on EPB performance.

The characteristics of containers used to store recyclables in the home until curbside collection appears to be an important influence on household curbside recycling behaviour. Recycling rates increase when householders are supplied with free
collection containers (Gitiltz, 1989; Guagnano et al, 1995; review by Porter et al., 1995), when containers are easy to handle (Pieters & Verhallen, 1986) and when fewer waste bags are necessary (Pieters & Verhallen, 1986). In a US study of householders, Gitiltz (1989) compared the use of buckets, sacks, stacking boxes or one large box. The researchers observed the number of containers put out for collection, weighed the waste and conducted telephone interviews with a sub-sample of respondents. The study found that using one box or stacking boxes was preferred over buckets or sacks because their shape allowed easier insertion of the waste, and more recycling was conducted by householders with these types of containers. In addition, householders liked the stacking boxes because they enjoyed the organization when sorting their waste, had the option of putting only one box out for collection if desired, the boxes had good capacity for waste, and their shape made it easy to fit waste. Residents with only one box enjoyed the ease of putting all waste in one place. Another study examined the characteristics of public rubbish receptacles and found that when the bins were more attractive (eg. shaped like birds), the amount of litter people put into them increased (Geller, Brasted & Mann, 1979/80).

Having space to be able to store recyclables in one’s home is another element of infrastructure that impacts on recycling behaviour. A perception that storing recyclables takes up valuable storage space results in less recycling behaviour (Boldero, 1995; DeYoung, 1988/89, 1990).

Structural characteristics of dwellings are an important influence on energy use by householders (Tienda & Aborampah, 1981). For instance, having an insulated home allows for a reduction in household energy use while still maintaining acceptable temperatures for comfort (Verhallen & Van Raaij, 1981). Larger houses, having multiple stories, and the presence of fireplaces have all been found to result in higher energy use, while having a shared wall results in lower energy use (Ritchie et al., 1981). In addition, those with central air conditioning units have been found to use more energy than those with window units (Pallak & Cummings, 1976). Structural characteristics of cars can also impact on energy use. Younger and more efficient vehicles use less petrol than older and less efficient cars (Ritchie et al., 1981). These structural considerations are linked to a behavioural choice when individuals purchase a property or car.
The availability of physical infrastructure can not only influence whether an individual will be more likely to perform an EPB, but may determine whether they are able to perform it at all. For example, public transport does not exist in some residential areas, making car use the only alternative (Tracy & Oskamp, 1983/84). A similar finding has been obtained regarding infrastructure systems. Reams, Geaghen and Grendron (1996) found that recyclable litter was found to decrease significantly after the introduction of a recycling program, but that there was no decrease in other types of littering.

v) General convenience
Studies that did not define convenience specifically also strongly demonstrate that increasing the convenience of household recycling corresponds with an increase in recycling behaviour (eg. Ewing, 2001; Oskamp, 1995b; Vining & Ebreo, 1990), with a few exceptions which did not find any effect of convenience on household recycling behaviour (Gamba & Oskamp 1994; Oskamp, Burkhardt, Schultz, Hurin & Zelezny, 1998).

In relation to energy use, a review of literature written during the US oil crisis found that people are more likely to endorse energy policies which cause the least inconvenience to them (Olsen, 1981).

Finally, Cottrell and Graefe (1997) found that the more convenient it was to pump sewerage from boats at a pumping station (rather than polluting the water), the more boaters used the pumping stations.

vi) Interaction of convenience with other variables
Convenience has been noted to interact with, or even override, other predictive factors in the performance of EPBs. Oskamp et al. (1998) note;

‘…many of the variables that predicted recycling behavior in past research have weaker relationships in…more convenient, curbside programs’ (p. 37).

Increasing convenience appears to facilitate the performance of EPBs regardless of attitudes. In the case of curbside recycling, Derksen and Gartrell (1993) found that even those who were not concerned for the environment recycled when they had access to a structured, institutionalised, easy and convenient curbside pickup
program, and McCarty and Shrum (1994) found that whether an individual perceives recycling to be convenient is a more important factor in determining their recycling behaviour than whether they believe recycling is important. Corraliza and Berenguer (2000) examined the interaction between attitudinal and contextual variables, and the effect that this interaction had on the performance of EPBs. As expected, they found that, for most behaviours, those who held favourable attitudes towards EPBs and felt that the contextual situation was one which facilitated the performance of those EPBs were the individuals who performed most EPBs, and those who had negative attitudes and found the situation to be inhibitory were the least likely. They also found that for two behaviours (recycling glass and recycling medicines) individuals who held negative attitudes but who found the situation to facilitate action performed more EPBs than those with positive attitudes who found the situation to be inhibitory. Thus, the strength of convenience appears to be a more influential driver for EPB performance than attitudes.

In addition, a study examining self-determination, i.e. choosing to perform a behavior based on intrinsic rewards, found similar results. Green-Demers et al. (1997) found that as EPBs became more convenient, the influence of self-determination on behavioural performance decreased.

1.2.2 Social norms

Social norms are defined here as the actual or perceived behaviours and attitudes of significant others. Significant others typically comprise family members, peers, work colleagues and neighbours, but can be other significant people in the life of an individual. Social norms can influence behaviour via two routes: observation of others, or pressure from others. This definition comprises the concept of 'descriptive norms', that is, what other people are doing around an individual. The concept of 'prescriptive norms', that is, what individuals are told is right or wrong to do, is covered under the heading 'leadership' in the current thesis.

The literature on social norms focuses on whether or not the beliefs of significant others impact on the frequency of performing EPBs. The mechanisms by which the process occurs (e.g. the influence of social norms due to simple imitation, or due to beliefs about the opinions of significant others) are not often discussed.
Research findings regarding the influence of social norms on the performance of EPBs have mainly shown a positive impact, with isolated studies finding no effect.

Social norms have been found to exert influence on the performance of curbside recycling behaviour. Oskamp et al. (1991) found that having friends and neighbours who recycle increased the likelihood that householders would recycle, and Vining and Ebreo (1992) found that recyclers perceived greater social pressure to recycle than non-recyclers. Interestingly, this study also found that perceived social pressure increased over time for both recyclers and non-recyclers after the introduction of the curbside program. In a Canadian study, Ewing (2001) found that social norms were a very important factor in determining the frequency of participation in a curbside recycling program. The wishes of other household members were found to play a much larger role than the wishes of friends and neighbours. A review of mainly US studies (Oskamp, 1995b) noted that social norms created by friends and neighbours could predict household recycling behaviour. A weak but positive relationship was found between social norms and curbside recycling behaviour by Gamba and Oskamp (1994) who found that pressure from neighbours influenced the frequency of curbside recycling for infrequent recyclers. Vining and Ebreo (1992) suggest that a possible reason for the finding that social norms influence curbside recycling behaviour is due to the high visibility of recycling bins.

The ‘Block leader approach’, an intervention using a social mechanism to increase household curbside recycling rates, has been used with success. A ‘block leader’ is a resident who speaks to neighbours about recycling as part of a formal intervention to increase this behaviour. The block leader encourages non-recycling households to recycle and prompts those who already recycle by providing reminders about upcoming pickup dates. The presence of block leaders has repeatedly been found to increase recycling behaviour by householders (Burn, 1991; Hooper & Nielsen, 1991; Nielsen & Ellington, 1983; review by Schultz et al., 1995).

The presence of a block leader may increase recycling behaviour via features of social norms such as modelling (Burn, 1991; Nielsen & Ellington, 1983), a desire for conformity (Nielsen & Ellington, 1983), the suggestion that one’s action is more likely to make a difference because others are also doing it (Burn, 1991), by providing social recognition (a social incentive) (Burn, 1991), or because the block leader has elicited a verbal agreement (Burn, 1991).
The influence of social norms may be less potent for energy saving EPBs due to the private nature of these behaviours. Participants in a study focusing on residential energy saving by Winett et al. (1978/79), for instance, reported that they did not chat to their neighbours about their in-home energy use over the duration of the study. This is in contrast to the highly visible nature of curbside recycling. However, some support for the influence of social norms on energy conservation behaviours has been found (review by Olsen, 1981). During the US oil crisis, Seaver and Patterson (1976) conducted a study in which unsuspecting participants were allocated to either a control group, a group receiving feedback about their energy use compared to the previous year, or a group receiving feedback plus a decal saying 'We are saving oil', if they had reduced their energy use since the previous year. Households who received the feedback plus the decal used significantly less oil than other two groups over four weeks. The authors believed that the decal represented social recognition and public commendation of their efforts. Pallak and Cummings (1976) conducted a study in which one group of householders was told that the research results were to be published in a newspaper including names of subject and amount of energy used by each (public condition) and another group was told that the results would be published anonymously (private condition). Those in the public condition subsequently used less energy than those in the private condition, as measured by utility readings. Those in the private condition used the same amount of energy as those in a control group.

In a study on encouraging water conservation behaviour, Aronson (1990) investigated the relative effectiveness of signage and modelling to reduce water consumption in the showers in public bathrooms at Santa Cruz University. A sign was installed in the men’s bathroom with instructions on how to use less water when showering by wetting down, turning the taps off when soaping up, and then rinsing off. Showering behaviour was discreetly observed by a researcher who appeared to be using the bathroom over the following weeks. Those using the showers resented being told what to do, as indicated by their kicking the sign. The sign was subsequently removed and a stooge modelled the desired showering behaviour when others came into the bathroom. These individuals were then also observed showering, and were found to shower using the unusual water saving technique more frequently. Aronson (1990) believes that the effectiveness of modelling arises due to its power to define social reality.
The positive influential impact of social norms on EPB performance is further supported by studies that have used ‘norm-based messaging’ as an intervention to increase the performance of EPBs. Norm-based messaging involves providing information to a target audience about what others are doing regarding a particular behaviour, and it is common to provide information about what others are doing in comparison to the individual being informed. Using norm-based messaging has been found to increase the performance of EPBs. Ferraro and Price (2013, cited in Ferraro and Miranda, 2014), for example, compared providing households with technical information about how to reduce their water use with providing households with technical information plus social comparison information which comprised social norm-based encouragement and a social comparison of household water use compared to median county consumption. The technical information only condition resulted in a non-significant change in household water use, and the social comparison condition resulted in a significant change in household water consumption. Bernedo, Ferraro and Price (2014) similarly found that norm-based messaging reduced household water use. Norm-based messaging has been used with success for other EPBs (review in Bernedo, Ferraro and Price, 2014).


Bamberg and Schmidt (2003) investigated the effect of a factor labelled ‘role beliefs’, which was defined as the extent to which participants, German university students, believed that it was appropriate to perform a particular EPB themselves. The EPB studied was mode of transportation to university. This factor was investigated as part of a test of the Theory of Interpersonal Behaviour (as per Triandis, 1977, 1980, cited in Bamberg & Schmidt, 2003). Role beliefs were found to be a strong predictor of intention (not a direct predictor of behaviour) to drive to university. They conclude there was a ‘…very strong influence of perceived external and self-generated social expectations on the intention to use the car for university routes’ (p. 281).

Various studies have found that social pressure is also an important influence on the performance of groups of EPBs. Parents, as an important social influence, were found to have an effect on their childrens’ levels of EPB performance when examining groups of EPBs. Villacorta, Koestner and Lekes (2003) found that college students were more likely to perform EPBs if their parents had shown an interest in
their environmental attitudes. Similarly, a Finnish study found that children of farmers had higher levels of environmental activity than children of entrepreneurs (Tikka, Kuitunen & Tynys, 2000). Acceptance by peers was also found to be an important predictor for performance of groups of EPBs (Axelrod & Lehman, 1993; Villacorta et al., 2003).

There are a few studies that have found that social pressure has no influence on the performance of EPBs. Using mailout questionnaires and observation of recycling behaviour, Oskamp et al. (1998) found no effect of pressure from family, friends and neighbours on curbside recycling behaviour. Using a telephone survey to US householders, Lindsay and Strathman (1997) found that the perceived proportion of community members who recycled or who bought recycled products did not influence the frequency of curbside recycling by suburban residents. Vining and Ebreo (1990) examined drop-off recycling (no curbside recycling was available at the time of the study) using a mailout survey, and found that both recyclers and non-recyclers rated social factors as being the least important reason for recycling. In an Australian study examining household newspaper recycling, Boldero (1995) found that, overall, respondents believed recycling to be important but did not comply with their friends, neighbours and council's thoughts about whether or not they recycled. The author believes this to be the case either because they did not know what others thought, or did not care to comply with the wishes of others.

Conflicting findings may be a result of differing measurement techniques or because of different times and locations of research. In addition, Olsen (1981) found that the influence of social pressure increases as it is internalized and experienced as personal responsibility and thus this factor may not emerge in studies because if an individual believes it to be internal, they may not acknowledge that it originated from social pressure.

An interesting finding related to social norms indicates a possible gender effect for this factor. Goldenhar and Connell (1992/93) found that for US university students, perceived social norms had a larger effect on intention to recycle for females than for males.

A recent meta-analysis by Abrahamse & Steg (2013) of studies that examined interventions aimed at increasing resource conservation behaviours using a social influence approach identified six types of interventions: use of social norms
(providing information to participants about what others are doing (descriptive social norms) and about which behaviours others approve/disapprove (injunctive social norms)), the use of block leaders and social networks, public commitment making to perform EPBs, modeling behaviour, feedback comprising social comparison (that is, how the individual’s behaviour compares to other individuals or groups) and feedback about whole group performance regarding a group of which the respondent is a part (individual contribution is not identified in this type of feedback). The meta-analysis found that social influence approaches are effective in increasing resource conservation behaviour but that the effect is small. More specifically, the results indicate that interventions involving face-to-face contact were the most effective, that results varied depending on the target group, that the effectiveness of the intervention depended on whether the individual already adhered to a similar social norm, that the effectiveness did not depend on the type of behaviour, and interestingly did not differ between more observable and less observable behaviours. The authors conclude that more research is needed to determine moderator variables in the relationships between social influences and ultimate behaviour.

1.2.3 Leadership

Leadership is defined here as *behaviour, instructions or sentiments of a person or body in a position of authority*. Although the literature in this area is sparse, findings suggest that the actions of those in leadership positions do affect the EPB performance of laypeople, and that this occurs through a variety of channels.

The two most direct influences of leadership on EPB performance are those of regulation and provision of services. Regulation in the form of penalties for failing to recycle have been found to increase recycling behaviour (Porter et al., 1995) and knowledge of sewerage dumping regulations has been found to have a significant relationship with the amount of sewerage dumped from boats (Cottrell & Graefe, 1997). Provision of services can increase convenience, such as by providing a curbside collection service in place of a drop-off recycling service, or even allow the behaviour to occur, such as by providing any form of local recycling service. Oskmap (2000a) succinctly notes:

‘…decisions of corporations and governments often sharply constrain the behavioral choices that are available to individuals’ (p. 497).
Another facet of leadership that has been examined in the literature is the influence exerted on citizens by the simple observation of the environmental actions or philosophies of their governments. A perception that their government is expending a large effort to assist the environment appears to encourage individuals to increase their personal efforts. This was evident in a study conducted in the European Union, where individuals were found to be more likely to recycle their household rubbish if they perceived that their government was making a ‘reasonable effort’ to protect the environment (Guerin, Crete & Mercier, 2001) and in an Australian study which found that individuals were more likely to justify their own non-recycling behaviour when they perceived their council was providing an inadequate curbside recycling service (Boldero, 1995). Conversely, one set of studies found that dissatisfaction with government responses to environmental problems inspired some to perform more EPBs (Pelletier Tuson, Green-Demers, Noels & Beaton, 1998).

A small amount of research has examined beliefs regarding ascription of responsibility for environmental problems and solutions, with disparate findings. Laypeople generally feel that governments are morally obligated to act to solve environmental problems regardless of who is perceived to be responsible for the harm, but private industry is only held morally accountable for environmental problems when they are seen to be directly responsible for the problem (Stern, Dietz & Black, 1985/86). Ewing (2001) found that attributing responsibility for environmental problems to either ordinary people, to governments or to corporations had no effect on curbside recycling behaviour. A separate study, however, found that those who held a stronger belief that the government was responsible for the energy crisis ran far more energy-efficient households (Rosson & Sweitzer, 1981). Boldero (1995) found in an Australian population that people hold local government bodies partially responsible for ensuring that recycling takes place by providing a curbside collection service. Trust of leadership can be dependent on which authority is distributing information. Guerin et al. (2001) found that people trust environmental organisations more than public authorities and the media. Seguin, Pelletier and Hunsley (1999) found that Canadians trusted environmental information from federal government but not from regional governments, and that they trusted public groups but not industry. Developing beliefs about taking personal responsibility for EPBs are an important predictor of their performance (Stern, 2000), and thus relying on government to solve environmental problems may inhibit the performance of EPBs.
One facet of leadership that needs to be considered is ‘reactance’, a phenomenon in which people react against contextual factors, for example, legislation, such that the original behaviour becomes more desirable (Weigel, 1985). In one study, flyers were distributed to swimmers at a public pool (Reich & Robertson, 1979). Some flyers told people not to litter and others told people to keep the pool clean. Flyers in a control condition told people to obey pool rules. External pressure from above was seen to produce a reactance effect for some swimmers, while appeals to internal pressure had a very slight effect in decreasing littering. A separate study by Aronson (1990) examined techniques to encourage people to use less water when showering in a public change room. It was observed that users of the change room often kicked signage with instructions about how to take shorter showers, and some took longer showers than usual after viewing the command signage. Aronson (1990) suggested that this may be attributed to ‘reactive defiance’ (p. 126).

Despite the evidence suggesting that leadership can play an important role in increasing the EPB performance of laypeople, leaders appear not to have access to, or indeed to desire access to, the research around methods which would make them more effective environmental behaviour change agents. For example, Winkler and Winett (1982) note that ‘…the effectiveness of psychological strategies are in a form and behavioral framework that is probably not understandable to many policymakers and, hence, not effective in influencing policy’ (p. 422). Similarly, Zerega (1981) noted that at the time of writing the US government was not utilizing available social science research into transportation energy conservation.

### 1.2.4 Nature experience

Nature experience is defined here as *time spent in wilderness areas in the past*. This factor has not been studied extensively.

Three studies have all found that higher levels of nature experience are associated with higher levels of EPB performance. A US study found that participation in forest-based recreation was correlated with an increased likelihood of donating money to, or belonging to, an environmental organisation, and that those who took part in wildlife watching were more likely to purchase environmentally preferred products (Teisl & O’Brien, 2003). Sia, Hungerford and Tomera (1986) found that those performing more EPBs were also more participatory in outdoor experiences such as family vacations, outings, hiking and camping. Using qualitative methods and
surveys with Swiss respondents, Finger (1994) found that the most important predictor of EPB performance was experiences in and with nature, including exposure to environmental disasters, seeing the destruction of immediate environments, and holidays. Those whose only experience of nature consisted of environmental catastrophes, however, were less likely to perform EPBs.

The type of nature experience may impact on prediction of EPB performance. Teisl and O’Brien (2003) found a trend for higher performance of EPBs by those who participated in appreciative activities, as opposed to consumptive outdoor activities.

This factor may be particularly important in the prediction of environmental activist behaviour. In a study examining paths to environmental activism, Chawler (1999) carried out interviews with identified activists in the USA and Norway. Responses indicated that a combination of formative experiences led to the activism, but that spending time in natural settings, particularly during childhood, was of primary importance. This was in combination with positive experiences with family members, such as parents, who modelled a valuing of nature.

1.2.5 Demographics

Demographic factors that have been investigated in the literature include gender, age, socioeconomic status, education level, political orientation, living in urban or rural areas and number of people living in a house.

The effect of demographics on EPB performance appear to be slight.

i) Gender

Mixed results have been obtained regarding the effect of gender on predicting the performance of EPBs, but overall it appears that women perform more EPBs than men. This result has been obtained for the performance of groups of EPBs with students across North, Central America, South America and Spain (Schultz, Zelezny & Dalrymple, 2000), for US householders (Baldassare & Katz, 1992) and in a study that examined samples across 14 countries (Zelezny, Chua & Aldrich, 2000). It has also been found for school recycling (Zelezny, Chua & Aldrich, 2000) and for paper recycling among US college students (Witmer & Geller, 1976). Women were more inclined toward EPB performance than men in a Swiss population (Finger, 1994), and Ingram and Geller (1975) found that female college students were more
responsive than males to interventions (flyers, verbal prompts, and raffle incentive) to increase paper recycling in dormitories. Bogner and Wilhelm (1996) found that among Bavarian teenagers, girls were more willing to take environmental action, whereas boys were more willing to dominate nature for the sake of people.

A meta-analysis, however, found no difference between the genders for a range of EPBs (Hines, Hungerford & Tomera, 1987), and a number of studies found no effect of gender for recycling behaviour (Arbuthnot, 1977; Cameron, Brown & Chapman, 1998; Owens et al., 2000; review by Schultz et al., 1995; Vining & Ebreo, 1990).

Gender may impact on the type of EPB performed. For example, Scott and Willits (1994) found that men were more likely than women to engage in relevant political behaviours and women were more likely than men to participate in environmentally-friendly consumer behaviours.

Stern et al. (1993) found that when women are more active on an environmental issue than men, it is more likely to be because they are better able to make connections between environmental conditions and their own values, rather than because they have different value structures to men.

ii) Age
Findings which indicate that young people perform more EPBs than older people include a meta-analysis which found that educational interventions designed to change behaviour were more effective with those under 18 years old (Zelezny, 1999), a Canadian study which found that households of older families were more inefficient energy users (Rosson & Sweitzer, 1981), a study in which the young were more supportive of environmental spending by their governments (Rasinski, Smith & Zuckerbraun, 1994), and a study with Bavarian teenagers that found that younger participants (5th and 6th graders) performed more EPBs than 9th graders (Bogner & Wilhelm, 1996). This finding, however, has not been found to be a strong predictor (Arbuthnot, 1977; meta-analysis by Hines et al., 1987).

Other studies suggest that older people perform more EPBs than younger people. Vining and Ebreo (1990) found that recyclers were older, Tikka et al. (2000) found that older students displayed higher levels of environmental activity, Ritchie et al. (1981) found that older people used less gas and Baldassare and Katz (1992) found this to be true for a random sample of householders. Further, Tucker (1978) found
that being older was a weak predictor of EPB performance, Ewing (2001) found that those under 30 years old were less likely to participate in curbside recycling, and homes with older residents were found to be kept warmer than other homes (Black, Stern & Elworth, 1985).

Still others have found no effect of age on the performance of a range of EPBs including purchasing decisions (Tucker, 1978), recycling (review by Schultz et al., 1995; Oskamp, et al., 1991; Owens et al., 2000), energy use (Ritchie et al., 1981), and for groups of EPBs (Cottrell & Graefe, 1997; Oskamp et al., 1991; Owens et al., 2000; Zelezny & Dalrymple, 2000).

These mixed findings may be related to cohorts of people aging and being investigated at different points in time. A Swiss study (Finger, 1994) indicated that those born prior to 1942 have generally not changed their behaviour to be more environmentally friendly, and those born after 1942 have made some changes. In addition, there appeared to be a generational correspondence with certain behaviours, in that those born after 1964 (the youngest sample in the study) and those born between 1943 and 1953 (called the 68-generation because they were affected by the zeitgeist in the late 60s, notably the anti-nuclear and political ecology movements) were overrepresented in protest behaviours, the next youngest group after the 68-generation were overrepresented in the performance of 'limited activism' and those born before 1942 (the oldest group) reported performing the least EPBs.

As cohorts age, these relationships are likely to shift.

iii) Socioeconomic Status (SES)
The effect on EPB performance of a number of different measures of SES, including income, social status, home ownership and occupational status have been investigated.

Higher income has been found to be associated with higher levels of recycling (Gamba & Oskamp, 1994; Guerin et al., 2001; review by Oskamp, 1995b; Oskamp et al., 1991; Owens et al., 2000; review by Schultz et al., 1995; Vining & Ebreo, 1990), a larger reduction in gasoline use during the US oil crisis (Pitts et al., 1981), more efficient energy use in homes (Rosson & Sweitzer, 1981), political behaviours (Scott & Willits, 1994), being more supportive of environmental spending by governments (Rasinski et al., 1994), more environmentally friendly consumer behaviour (Scott &
Willits, 1994) and EPBs in general (Tucker, 1978). A meta-analysis also concluded that those with higher incomes were slightly more likely to perform EPBs (Hines et al., 1987).

A number of studies, however, have found income to be unrelated to the performance of a range of EPBs (eg. Baldassare & Katz, 1992; Cottrell & Graefe, 1997). O'Connor, Bord, Yarnal and Wiefek (2002) found that economic circumstances were not a predictor for people to express support for reducing greenhouse gas emissions and Derksen and Gartrell (1993) found no effect of income on recycling behaviour. Higher income has been associated with higher energy use (Ritchie et al., 1981; Winett et al., 1978/79).

Income may operate indirectly by residents being able to afford structural changes to their homes. For example, Tienda and Aborampah (1981) found that those with higher incomes were more likely to weatherize their homes and to install heating conversions that allowed the use of more environmentally-friendly fuels.

Owning one’s own home, as opposed to renting, has been found to be a positive predictor of recycling (Oskamp, 1995b; Oskamp et al, 1991; Owens et al., 2000) and ability to install structural investments (Black et al., 1985; Stern et al., 1983; Tienda & Aborampah, 1981). It is possible that home owners feel a greater sense of responsibility to save energy than renters as part of their general home upkeep (Black et al., 1985; Stern et al., 1983).

Higher occupational status has been found to be associated with higher levels of EPB performance (Weigel, 1977), and being employed full time has been found to be associated with higher recycling rates (Ebreo & Vining, 2001), but Derksen and Gartrell (1993) found that job prestige was not a predictor of curbside recycling.

In studies where the measure for SES has not been defined, higher SES has been found to be associated with higher levels of EPB performance (Arbuthnot, 1977; Schultz et al., 2000; Tucker, 1978), including for recycling behaviour (Arbuthnot, 1974), but no clear effect of SES on curbside recycling was found by Nielsen and Ellington (1983).
iv) Education
A number of studies have found that higher education corresponds with higher levels of general EPB performance (e.g. Finger, 1994; Weigel, 1977) including political EPBs (Scott & Willits, 1994), being more supportive of environmental spending by government (Rasinski et al., 1994), reducing gasoline use during the oil crisis (Pitts et al., 1981) and more efficient energy use within the home (Rosson & Sweitzer, 1981). This finding has been replicated in some studies on recycling (Derksen & Gartrell, 1993; Ewing, 2001; Guerin et al., 2001; Owens et al., 2000), but other studies do not indicate a clear relationship between education and recycling (meta-analysis by Hines et al., 1987; review by Schultz et al., 1995). A small number of studies have found education to be unrelated to the performance of a range of EPBs (Baldassare & Katz, 1992) and recycling (Arbuthnot, 1977; Oskamp et al., 1991).

v) Political orientation
Generally, a leaning toward political liberalism is associated with higher performance of a range of EPBs (Weigel, 1977) including consumer behaviours (Scott & Willits, 1994), recycling (Arbuthnot, 1977) and for expressing support for reducing greenhouse gas emissions (O’Connor et al., 2002). Two studies, however, found no effect of political orientation on curbside recycling (Guerin et al., 2001; Oskamp et al., 1991), and Baldassare and Katz (1992) found political orientation to be an insignificant predictor of the performance of a group of EPBs, although they did find that those with a more conservative political orientation were more likely to perform the specific EPB of conserving water at home.

vi) Living in urban or rural areas
Very little research has examined the relative impact on EPB performance of living in an urban compared to a rural setting. Living in an urban area has been found to be a positive predictor of recycling behaviour in one study (Derksen & Gartrell, 1993). This appeared to be the result of urban residents having access to more structured and convenient recycling systems than rural residents. Regional differences, however were not found to affect gasoline use by Ritchie et al. (1981), and Geller (1981) found no differences between the behavioural intentions of rural and urban participants related to energy reduction.

Rurality has been found to be a determinant of travel behaviour. Those living in rural areas in a range of countries have been found to use their cars rather than environmentally preferred travel mode choices more than urban dwellers. A large
study conducted in Germany using data from 1976-2002, for example, found that those in rural areas use cars more than those in urban areas, especially compared to those who live in central urban areas (Scheiner, 2010). A US study (Pucher & Renne, 2005) found that 97% of rural households owned at least one car compared to 92% of urban households, and 91% of trips were found to have been made by car in rural areas compared to 86% in urban areas. Similar results have been found in Ireland (McGrath, 1999) and England (Green, Morris & Wade, 2012). This difference between rural and urban travel mode choice is due to the greater accessibility of residences and activities in urban areas (Pucher & Renne, 2005) and lack of public transport in rural areas (Green, Morris & Wade, 2012).

vii) Additional demographic findings
Using surveys in Canada, Axelrod and Lehman (1993) found that a community sample reported higher levels of EPBs than did a student sample. Interestingly, they found that the community perceived economic rewards and social recognition as more important outcome desires for performance of EPBs than did the student sample.

Those closer to environmental issues appear to perform more EPBs. Using written questionnaires to students in Finland, Tikka et al. (2000) found that students majoring in biology were the most active in environmental activities, followed by forestry students. Students of commercial studies, statistics and economics were the least active.

Those living in family households have been found to be more likely to recycle than those living in non-family households (Ewing, 2001).

A number of reviews and studies have found that living in a single family home is a strong predictor of curbside recycling in the US (Oskamp et al., 1991; Oskamp, 1995b; Ebreo & Vining, 2001) and Canada (Derkson & Gartrell, 1993). Although demographically based, it is possible that this is about personal responsibility, rather than a demographic factor, as those living in single family homes have sole responsibility for their rubbish collections, and so may take more responsibility for it, as opposed to those living in blocks of apartments, who may not feel personally responsible for the rubbish collection as the responsibility is shared between all occupants of the block. The same appears to be true for energy use. For example, residents of mobile or apartment units have been found to be less likely to use
alternative fuels than residents of single family dwellings in the US (Tienda & Aborampah, 1981).

1.2.6 Cultural context

The cultural context is defined here as the wider culture relevant to individuals.

Differences have been noted between cultures across a range of constructs related to EPB performance. For example, Schultz and Zelezney (1998) found full support for Schwartz’s Norm Activation Model of moral decision making (see Section 1.2.8 for a description) in a US sample, but only partial support in samples from Mexico, Nicaragua, Peru and Spain. Inconsistent scores for the NEP attitude scale (see Section 1.2.7 for a description) have also been found across countries. One study discovered that environmental sensitivity was a greater predictor of EPB performance in American samples than in a Taiwanese sample (Hsu & Roth, 1999), and in a study examining the signing of an antipollution petition in Hong Kong, the authors note that ‘public acts of commitment [such as signing a petition] tend to conflict with the Chinese social norms of propriety and conformity’ (Hamid & Cheng, 1995, p. 695). Stern et al. (1993) illustrate this point further by pointing out that when the Soviet Union began to dissolve in 1989/90, much environmental activism was inspired by nationalist concerns regarding exploitation of resources in non-Russian areas by the Russian dominated government. This is one example of a value driven driver that is different to those held in Western culture.

Even across modern Western nations some differences exist. Rasinski et al. (1994) conducted a study to examine support for government spending on the environment in Australia, West Germany, Great Britain, Northern Ireland, the United States, Hungary, Italy, Norway and Israel. Although some trends were identified across countries (eg. that younger, more highly educated people were more supportive of government spending on the environment), there were also differences, such as those nations who were most supportive of government funding for the environment were also more supportive of government spending on other social issues. Substantial differences were also found regarding the priority given to the environment relative to other social concerns. Arbuthnot and Lingg (1975) surveyed matched samples of American and French adults and found that ‘While minimal differences were observed in recycling, the relationships of this behavior with other variables indicated differing conceptions between cultures’ (p. 275). Specifically, the
Americans’ environmental attitudes were more pro-ecological, were more internally consistent, and were more likely to be related to environmental behaviour and knowledge and other attitudinal and personality variables’ (p. 275).

Differences can also exist across ethnic groups in the same countries, for instance Hispanic women were found to be less positive toward the natural environment than other groups in an American sample (Zimmermann, 1996).

Guerin et al. (2001) examined how societal contextual factors interacted with individual factors in determining household recycling across the 15 countries of the European Union. They found that country level variables were powerful predictors of recycling behaviour, explaining 76% of the variance in recycling behaviours between the countries. More specifically, they found that the more people within a country who are members of ecological associations, the more likely the residents of that country are to recycle (strong predictor) and that countries that have instituted legislation to discourage landfilling and to encourage recycling have higher levels of recycling (weak predictor). Also, recycling rates were higher in countries experiencing concrete environmental problems, and in countries that experienced marked deforestation. The authors conclude that broad contextual influences are a neglected predictor of pro-environmental behaviour, and that they play a major role.

The wider social context and culture may encourage or prevent particular EPBs. Dholakia, Dholakia and Firat (1983) posit that Western culture (American in particular) has evolved into one with innumerable social structures that rely on high energy use, and into a culture that expects to consume large amounts of energy. Deviating from this pattern will inevitably involve high costs, including both financial and quality of life sacrifices. Consumers, therefore, currently have little choice but to use large amounts of energy. Further, Olander and Thogersen (1995) have noted that the dominant culture around consumerism, which underpins many environmental problems, makes it difficult to achieve sustainable practices.

1.2.7 Attitudes

Attitudes are broadly defined in the current thesis after Eagly and Chaiken (1993) as assessments made by an individual regarding the world around them. Assessments contain some degree of favour or disfavour, and they can be about an object, an idea
or an event, including a behavioural event. Attitudes are tendencies that can change over time.

An important distinction is made here between specific attitudes and general attitudes. Specific attitudes are defined as assessments about a specific object, idea or event, for example ‘Putting my empty juice bottles on the curb for recycling on council collection days helps to reduce the problem of landfill’. General attitudes are defined as wider assessments about a larger topic area, for example ‘Recycling helps the environment’. General attitudes are broader than specific attitudes, and narrower than values (see Section 1.2.8 for a description of ‘values’ as defined in the current manuscript).

1.2.7.1 Methodological considerations of the attitude-EPB literature

In addition to the considerations regarding methodological issues that have been noted in regards to assessing the wider EPB literature, there are a number of methodological problems specific to the attitude-EPB literature which impact on the reliability of a review.

The construct of attitudes is difficult to define as it is so abstract and broad. This has resulted in a large range of definitions existing, even within the narrow field of EPB research. Schultz and Oskamp (1996), for example, cite Ajzen (1991) and Madden, Ellen and Ajzen (1992) and they define attitudes as ‘subjective positive or negative evaluations of performing the behavior’ (p. 375) whereas Oskamp et al. (1998) define them as ‘general environmental concern’ and Tarrant and Cordell (1997) defined attitudes as ‘…beliefs and feelings about an object…’ (p. 619). The wide variability in the definitions of attitudes used in the EPB literature causes two problems. First, it makes it difficult to meaningfully compare the results of studies, or even to group studies together. Secondly, the many and various descriptions of attitudes result in the definition of attitudes becoming so broad that it covers so many types of thought that it becomes meaningless as a discreet construct.

Another methodological problem in the attitude-EPB literature is that different researchers have used vastly different scales to measure what they have conceptualized as the attitudes relevant to environmental behaviours. For example, Luzar and Diagne (1999) used questions on behavioural beliefs, subjective evaluation of those beliefs and normative beliefs, Maloney and Ward (1973, 1975)
developed an attitude scale measuring ‘Verbal Commitment’, ‘Actual Commitment’, ‘Affect’ and ‘Knowledge’, and Pooley and O’Connor (2000) used a questionnaire called the Environmental Attitude Survey. A number of articles neglected to describe the attitude measures used in the studies they were describing (eg. Greenwald-Robins & Greenwald, 1994). The inconsistency in scales used to measure attitudes relating to EPBs again means that the reliability of comparing results of studies is tenuous.

In addition, the type of attitude measured impacts on the relationship found. For instance, Seligman et al. (1979) found that attitudes regarding comfort and health significantly predicted household energy consumption, but that attitudes regarding the individual’s role in conserving energy only weakly predicted the same behaviour. The way attitudes and behaviours are measured can affect the findings of the study. In one attitude-EPB study Axelrod and Lehman (1993) found that general attitudes were highly associated with behaviour at the univariate level, but that this reduced to a non-significant contribution to explaining variance when measured by a multivariate procedure. Further, different scales have been found to produce different attitude-behaviour correlations for different populations (Tarrant & Cordell, 1997).

Variability in the quality of questionnaires used is also problematic. Tarrant and Cordell (1997) suggest that reliance on poor quality attitude measures can be a reason why attitudes and behaviours are frequently not found to correspond.

An additional methodological issue is that attitude-EPB questionnaires have often been developed with little or no theoretical guidance (Schultz et al., 1995).

An exception to the above problems is the use of the New Ecological Paradigm Scale, or NEP (Dunlap & Van Liere, 1978; Dunlap, Van Liere, Mertig & Jones, 2000), a measure of general environmental attitudes (Dunlap & VanLiere, 1978; Scott &Willits, 1994). The NEP, a widely used attitude scale in the EPB literature, has been subject to the largest amount of methodological assessment (Stern, Dietz & Guagnano, 1995). It has been found to be both a valid and reliable survey instrument (eg. Albrecht, Bultena, Hoiberg & Nowak, 1982; Dunlap & VanLiere, 1978; Dunlap et al., 2000). The authors define the scale as measuring deep beliefs about the nature of the earth and humanity’s relationship to it (Dunlap et al., 2000). Various studies have identified three dimensions within the scale, being ‘Balance of nature’, ‘Limits to

1.2.7.2 Findings of attitude-EPB studies

The relationship between relevant attitudes held by an individual and the corresponding EPBs performed by that individual appears to be a complex one.

Findings of a number of studies that found a direct link between attitudes and EPB performance appear in Table 1.1, including brief descriptions of the attitudes and behaviours measured in those studies.
### Table 1.1

**Positive correlations between attitudes and EPB performance**

<table>
<thead>
<tr>
<th>Name of study</th>
<th>Attitudes measured</th>
<th>EPB found to correspond</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baldassare &amp; Katz (1992)</td>
<td>Perception of threat to one’s health and well being posed by environmental problems.</td>
<td>Conserving water at home (r=.09*), recycling at home (r=.08*), limiting driving (r=.19**) and buying environmentally safe products (r=.16**).</td>
</tr>
<tr>
<td>Bang, Ellinger, Hadjimarcou &amp; Traichal (2000)</td>
<td>Level of concern for the environment, and belief that using renewable energy has positive effects for the environment.</td>
<td>Being willing to pay extra for renewable energy (concern: t=3.781***, belief: t=3.18**)</td>
</tr>
<tr>
<td>Bogner &amp; Wilhelm (1996)</td>
<td>Having consideration for nature and believing that it is not acceptable to exploit nature for human use.</td>
<td>A range of environmentally responsible behaviours, eg. switching off lights, separating waste for recycling, heater not on too high, travel-mode choice etc. (consideration: r=.61****, exploitation: r=-0.57****)</td>
</tr>
<tr>
<td>Greaves, Zibarras &amp; Stride, 2013</td>
<td>TPB constructs</td>
<td>TPB constructs were able to explain 61% of the variance relating to intentions to turn off computer screens when leaving the computer for more than an hour, 46% of the variance related to using video-conferencing in preference to travelling for meetings and 53% of the variance relating to recycling waste in the office.</td>
</tr>
<tr>
<td>Reference</td>
<td>Summary</td>
<td>Results</td>
</tr>
<tr>
<td>-----------</td>
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<td>---------</td>
</tr>
<tr>
<td>Guerin et al. (2001)</td>
<td>Global environmental concern.</td>
<td>Curbside recycling ($\gamma_{10}=.06^{***}$).</td>
</tr>
<tr>
<td>Jakovcevic et al., 2014</td>
<td>Concern for the environment</td>
<td>Concern for environment was cited as the primary reason for lower use of single-use plastic bags and higher frequency of bringing own bag (42% of respondents).</td>
</tr>
<tr>
<td>Poortinga, Whitmarsh &amp; Suffolk, 2013</td>
<td>Attitude toward a charge for single-use plastic shopping bags in Wales.</td>
<td>Attitudes towards a charge for single-use plastic bags became more positive when behaviour increased in response to an introduced charge for plastic bags (support within Welsh population went from 59% to 70%).</td>
</tr>
<tr>
<td>Tarrant &amp; Cordell (1997)</td>
<td>NEP Scale.</td>
<td>Self-reported EPBs (recycling, buying packaging, product choices, car use, watching or reading about environmental issues, supported environmental groups or political policies) ($r=.44^{***}$).</td>
</tr>
<tr>
<td>Tikka et al. (2000)</td>
<td>Attitudes towards nature. (eg. ‘Protection of environment reduces our material welfare’, ‘Wandering in nature is interesting and refreshing’ – to be answered using a 5-point scale).</td>
<td>Higher levels of participation in a range of nature experiences or EPBs, eg. how many species of bird they could recognize, how many times they had gone fishing in the last year, what kind of waste they recycled, if they used environmentally friendly detergents ($r_s=0.326^{**}$, df=462).</td>
</tr>
</tbody>
</table>

*p<.10, **p<.05, ***p<.01, ****p<.001

There are also many studies, however, that have found that attitudes are not good predictors of EPBs. A study conducted in the Netherlands found that attitudes only explained 2% of EPB performance (Verhallen & Van Raaij, 1981) and Lindsay and Strathman (1997) found that curbside recycling was not predicted by level of perceived societal benefit of preventative action. Similarly, those who supported
environmental policies during the US oil crisis were no more likely to increase their performance of energy conservation behaviours (Olsen, 1981), and Gamba and Oskamp (1994) found that neither specific nor general attitudes correlated with recycling behaviour. Geller (1981) found that participating in an energy-reduction workshop raised levels of concern for the energy crisis and increased optimism that the behaviour of individuals can have a real impact. However, follow up six to eight weeks later at the homes of participants indicated ‘….little behavioral effects of the conservation workshop’ (p. 333).

Still others studies have found that there is a relationship between attitudes and EPB performance, but that this relationship is very weak (eg. McKenzie-Mohr, Nemiroff, Beers & Desmaris, 1995).

i) High attitudes, low behaviour
Very high levels of positive attitudes towards the environment and towards protecting the environment have commonly been found among the majority of the public in Western countries for many years, including Australia (Boldero, 1995), the USA (Albrecht et al., 1982; Baldassare & Katz, 1992; DeYoung, 1988/89; Dunlap & VanLiere, 1978; Dunlap et al., 2000; Noe & Snow, 1989; Scott & Willits, 1994; Vining & Ebreo, 1992), Canada (Derksen & Gartrell, 1993; Ewing, 2001), the Netherlands (Verhallen & Van Raaij, 1981), and across Europe (Finger, 1994).

Despite the very high level of positive attitudes found, there is a distinct low level of correspondence with EPB performance. Table 1.2 contains a summary of five studies from a range of countries that found that EPB performance did not correspond with high levels of pro-environmental attitudes.
Table 1.2

No correlation between widespread positive attitudes and EPB performance

<table>
<thead>
<tr>
<th>Name of study, and country</th>
<th>Widespread positive attitudes found</th>
<th>EPBs that did not correspond</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boldero (1995) Australia</td>
<td>Respondents believed recycling to be important.</td>
<td>Low levels of recycling found.</td>
</tr>
<tr>
<td>Derksen &amp; Gartrell (1993) Canada</td>
<td>Concern for the environment expressed by vast majority of individuals.</td>
<td>They did not all recycle.</td>
</tr>
<tr>
<td>Finger (1994) Switzerland</td>
<td>Fear about environmental problems was high.</td>
<td>Did not lead to the performance of EPBs.</td>
</tr>
<tr>
<td>Hampel, Boldero &amp; Holdsworth (1996) Review of Australian data</td>
<td>Concern about environmental degradation found to be high.</td>
<td>Corresponding level of EPBs not apparent.</td>
</tr>
<tr>
<td>Lindsay &amp; Strathman (1997) USA</td>
<td>Respondents believed that recycling is beneficial to the natural environment, thought that the collective outcome from not recycling was severe to the environment (but that such outcomes were unlikely to occur) and they believed they were capable of recycling.</td>
<td>Did not recycle widely.</td>
</tr>
</tbody>
</table>

The almost universal nature of positive environmental attitudes without corresponding behaviours suggests that attitudes are not powerful predictors of EPB performance. It also renders the ability of attitudes to discriminate between those who perform EPBs and those who do not as severely reduced (Derksen & Gartrell, 1993), and it suggests that holding positive environmental attitudes does not cause a shift towards more environmentally preferred behavioural choices. Household recyclers and non-recyclers have commonly been found to share high levels of positive environmental attitudes (eg. Arbuthnot, 1977; Vining & Ebreo, 1990), meaning that environmental attitudes do not have the power to discriminate between the behaviour of the two groups.

There are a number of possible reasons why almost universal positive environmental attitudes do not translate into almost universal positive environmental behaviours. The high levels of positive attitudes found in many studies may be due to a social
desirability effect (Bang et al., 2000), or there may be barriers interfering between the attitudes and behaviours. DeYoung (1990), for instance, found that inconvenience and lack of procedural knowledge prevented many people from recycling, despite widespread positive attitudes towards recycling. In addition, there are other characteristics of the attitude-behaviour relationship which may be influential in final behavioural choices, such as the specificity of the attitudes. These characteristics are described below.

ii) Specificity
The wider psychological attitude literature has consistently found that the specificity of attitudes is an important consideration when examining the relationship between attitudes and behaviour (Weigel, 1985). Attitudes about a general topic appear to be good predictors of general behaviours related to that topic, but not of any one specific behaviour within the topic area, and attitudes about specific behaviours appear to be good predictors of those particular behaviours, but not of a group of similar behaviours in the same topic area (review by Weigel, 1985). A lack of congruence of specificity between the attitudinal and behavioural measures can often be a reason why attitudes and behaviours are found not to correspond (Tarrant & Cordell, 1997; Weigel, 1985). This finding appears to hold true in the EPB literature as well (meta-analysis by Hines et al., 1987; Humphrey et al., 1977; Oskamp, 1995b; Oskamp et al., 1991; Vining & Ebreo, 1992).

Holding general pro-environmental attitudes has repeatedly been found not to significantly predict specific EPBs. A number of studies found this for recycling behaviour (Arbuthnot, 1974; Gamba & Oskamp, 1994; Oskamp et al., 1991). It has also been found for energy use. During the US oil crisis, household energy use was not found to correspond with belief in the crisis (review by Olsen, 1981; Seligman et al., 1979), or with a measure of general attitudes (Ritchie et al., 1981), and a majority of participants in a US study reported high concern for energy conservation (as measured by a general item), but reported relatively low participation in energy efficient behaviours (as measured by specific items) (Tracy & Oskamp, 1983/84).

Holding general environmental attitudes, however, does correspond more consistently with measures of general environmental behaviours, that is, a measure comprising a compilation of two or more different EPBs. The NEP (a measure of general attitudes) was found to predict general behaviours well for university students in 14 countries across North, Central America, South America, and Spain
and higher EPB performance has been found to be associated with more concern for the environment (Cottrell & Graepe, 1997). Pickett, Kangun and Grove (1993) found that those who are more verbally committed to the environment may increase conservation behaviours, and individuals were found to want to reduce emissions if they perceive substantial risks from climate change (O’Connor et al., 2002).

Specific attitudes have also been found to correspond well with specific EPBs. A meta-analysis by Hines et al. (1987) found that a range of specific EPB attitudes had slightly stronger relationships with behaviours than attitudes toward the environment in general, and awareness of health risks posed by environmental problems has been found to be a better driver of environmentally responsible behaviours than general environmental concern (Seguin et al., 1999). In relation to recycling, a review by Schultz et al. (1995) found that attitudes specific to recycling corresponded well with recycling behaviour, and specific attitudes about the seriousness of the household waste problem and belief in the effectiveness of recycling have also been found to be related to recycling behaviour (review by Oskamp, 1995b; Vining & Ebreo, 1992). Similarly for energy use, Seligman et al. (1979) found that attitudes regarding comfort and health significantly predicted energy consumption associated with air-conditioning during summer and Winett et al. (1978/79) found that higher ratings of the importance of setting electricity reduction goals correlated with lower household energy use.

Specific EPB attitudes may not be environmentally based. The attitude may be about the convenience of performing the behaviour (eg Winett et al., 1978/79), or other benefits such as health or social benefits.

Again, there are studies which demonstrate exceptions. Three studies were noted that found a correlation between general pro-environmental attitudes and specific behaviours. Oskamp et al. (1998) found that endorsement of the NEP predicted the specific behaviour of higher amounts of waste put out per recycling collection, Guerin et al. (2001) found that global environmental concern had a positive impact on recycling behaviour and Weigel and Weigel (1978) found a measure of general environmental concern could predict pettioning behaviour, litter collection and recycling.
No studies were identified that examined the relationship between specific attitudes and general behaviours.

iii) The interaction of contextual variables and attitudes

The attitude-behaviour relationship is heavily influenced by contextual variables. Guagnano et al. (1995) have developed a generalized theory about attitude/behaviour/context relationships which they named the ‘ABC Theory’. The theory states that behaviour (B) is a function of an organism and its attitudes (A) and the context in which the behaviour is being performed (C). Importantly, the theory states that A and C interact to produce B. The predictive power of A on B is largely dependant on the strength of C. The effect that A has on B is largest when C is neutral, and smallest or non-existent when C is strong. When C is strong, it may either compel the behaviour or prohibit it. Examples of strong C include the task being more difficult, more time consuming and more expensive. Support for this formulation has been found in a number of studies of various EPBs (review by Stern, 2000).

There are numerous examples in the EPB literature of studies demonstrating contextual variables having sufficient strength to override the power of attitudes to produce behaviour. Convenience has been found to override attitudes in the prediction of recycling behaviour. Derksen and Gartrell (1993) found that attitudes are only able to predict recycling in areas with good access to a structured recycling system, but are not strong enough to overcome the barriers to performing recycling behaviour produced by a lack of access to such a system. McCarty and Shrum (1994) found that attitudes about recycling being inconvenient were much stronger indicators of recycling behaviour than a belief that recycling was important. During the introduction of a curbside recycling program in the USA Guagnano et al. (1995) found that respondents held high recycling attitudes, but that the convenience of possessing an appropriate bin and being provided with the curbside pickup service was a more important predictor of recycling behaviour. Social norms can also override attitudes to produce recycling behaviour. Hooper and Nielsen (1991) found that the presence of a block leader, a neighbour who encouraged others to recycle, increased curbside recycling, regardless of attitudes. Bagozzi and Dabholkar (1994) found that past behaviour was a much stronger predictor of intention to recycle than were attitudes. Finally, in a study examining paper recycling, Humphrey et al. (1977) found that other factors, such as social norms and convenience, were found to come between attitudes and behaviour and they thus concluded that it is difficult to gauge
the effect of attitudes because it is influenced by so many other factors. In a comprehensive review article, Weigel (1985) listed contextual variables which lead to increases in consistency between attitudes and behaviour, including the situation being more familiar, supportive social norms being present, and the individual possessing procedural knowledge regarding the behaviour.

A favourable context may override the motivational push of attitudes. In one striking study DeYoung (1988/89) observed the curbside frequency of 200 US householders in an area that had been serviced with a council curbside pickup for over 10 years. Ninety-one respondents subsequently agreed to answer questionnaires. Pro-recycling attitudes were measured by level of agreement to the following items: ‘Recycling is good because it helps to reduce imports’, ‘I like it when stores carry recycled products’, ‘A good reason to recycle is to reduce the need for landfills’, and ‘It really bothers me to see things go to waste’. The extent to which recycling was viewed as trivial was measured with agreement to the following items – ‘I would feel funny being the first on my block to recycle’ and ‘Recycling is a hobby which some have time for and others don’t’.

The study discriminated four groups of people – recyclers were evenly split between those with less positive and those with more positive pro-environmental attitudes, and the non-recyclers were similarly evenly split. That is, there were, as expected, people with more positive pro-recycling attitudes who did recycle and those with less positive attitudes who did not recycle, but there were also those with more positive attitudes who did not recycle, and most surprisingly, those with less positive attitudes who did recycle. This is the most interesting group as they were performing a relatively inconvenient EPB despite holding negative attitudes towards it. Procedural knowledge and level of perceived convenience of the behaviour were the factors that differentiated the recyclers and non-recyclers, not attitudes.

Attitudes are more effective predictors of EPBs when the context makes it difficult to perform the behaviours. Attitudes have been found to better predict recycling behaviour when it requires a large effort (Guagnano et al., 1995; Schultz & Oskamp, 1996; Schultz et al., 1995).

These findings indicate that contextual factors override attitudes in determining levels of EPB performance. The influence of attitudes, however, can not be disregarded, even when the contextual factors are strong. Derksen and Gartrell (1993) found that
those with positive attitudes are even more likely than those with negative attitudes to recycle when all have access to a curbside program.

iv) Strength of attitudes
The relative strength of attitudes may be an important and overlooked feature of the attitude-EPB relationship. One study that examined this feature of attitudes found that although global attitudes held by household recyclers and non-recyclers did not differ, recyclers believed in them more strongly than non-recyclers (Vining & Ebreo, 1992). In addition, a comprehensive review by Weigel (1985) concluded that there is more consistency between attitudes and behaviour when the individual is more certain of the attitude and when the attitude has high salience for the individual.

v) Behaviour leading to attitudes
One counterintuitive aspect of the attitude-behaviour relationship is the finding that performing particular behaviours can lead to the formation of favourable attitudes toward those behaviours, as opposed to attitudes leading to the behaviours (Aronson, 1992; Geller, 2002). Weigel (1985) suggests that contextual factors may foster behaviour which is then viewed favourably by the individual. Vining and Ebreo (1992), for instance, found that both specific and general favourable attitudes increased over the course of the introduction of a curbside recycling program in the US, and Poortinga, Whitmarsh and Suffolk (2013) found that attitudes towards bringing own reusable bags for shopping became more positive for Welsh consumers after this behaviour increased in response to the introduction of a charge for single-use carrier bags.

A possible explanation for this relationship if the phenomenon of ‘cognitive dissonance’. Aronson (1992) summarizes Cognitive Dissonance Theory as originally presented by Festinger (1957, cited in Aronson, 1992) as stating that: ‘If a person held two cognitions that were psychologically inconsistent, he or she would experience dissonance and would attempt to reduce dissonance’ (p. 304). Performing a behaviour that is inconsistent with one’s beliefs for a range of reasons such as convenience or legal requirements, will cause dissonance. In order to reduce this dissonance an individual could change their behaviour to match previous beliefs, but they are more likely to reduce the dissonance by altering their beliefs to match the new behaviour. This conclusion is borne out in numerous empirical studies (Aronson, 1992). Aronson (1992) further summarizes his own contribution to the theory which emphasizes the centrality of the self-concept, being that ‘...most
individuals strive for three things: 1. To preserve a consistent, stable, predictable sense of self, 2. To preserve a competent sense of self, 3. To preserve a morally good sense of self (p. 305) and that threats to any of these will produce dissonance and therefore possible changes in cognitions in order to restore stability.

The psychological processes inherent in Self-Perception Theory (Bem, 1972, cited in Bator & Cialdini, 2000) have also been suggested as an explanation. This theory states that individuals observe their own behaviour and then infer reasons for it.

Finally, Thogersen (1993) postulated that performing an EPB may increase the salience of one's own pro-environmental attitudes, thus encouraging the performance of other similar EPBs. In a telephone study with Danish adults, however, he found that recycling behaviour did not appear to increase the salience of environmental attitudes, and he also found that recycling did not indicate a feeling of moral responsibility regarding waste avoidance (Thogersen, 1993). Thus, it does not appear that attitudes lead to behaviour thorough attitudes becoming more salient when behaviour is performed (Thogersen, 1999).

The relationship between attitudes and behaviour may be circular, with behaviour leading to changes in attitudes which subsequently contribute to further changes in behaviour (Stern, 1992; Weigel, 1985).

vi) The Theory of Reasoned Action and the Theory of Planned Behaviour
The Theory of Reasoned Action (Ajzen & Fishbein, 1980) and the Theory of Planned Behaviour (Ajzen, 1991) are the most widely used models of the attitude-behaviour relationship in the psychological literature.

The Theory of Reasoned Action, or TRA (Ajzen & Fishbein, 1980), posits that behaviour can best be predicted by an individual’s intention to perform the behaviour. Intentions, in turn, are determined by the attitudes held toward that specific behaviour, as well as perceived subjective norms which are a ‘...perception of the social pressures put on [an individual] to perform or not perform the behavior in question’ (p. 6). Finally, attitudes and subjective norms are functions of normative beliefs, that is, beliefs that other individuals and/or groups believe that you should perform or should not perform the behaviour. Figure 1.1 contains a diagrammatic representation of the theory.
The Theory of Reasoned Action (TRA) further develops the TRA by supplementing the concept of ‘perceived behavioural control’, removing ‘normative beliefs’, and adding some additional relationships among the variables, as seen in Figure 1.2. ‘Perceived behavioural control’ is defined in the same way as the ‘self-efficacy’ factor described in the current thesis (section 1.2.11).

The Theory of Planned Behaviour, or TPB, (Ajzen, 1991, Ajzen & Madden, 1986) further develops the TRA by supplementing the concept of ‘perceived behavioural control’, removing ‘normative beliefs’, and adding some additional relationships among the variables, as seen in Figure 1.2. ‘Perceived behavioural control’ is defined in the same way as the ‘self-efficacy’ factor described in the current thesis (section 1.2.11).
The TRA and TPB state that specific attitudes toward a behaviour can predict the intention to perform that behaviour, but that general attitudes do not necessarily impact on intention. General attitudes, however, can indirectly affect behavioural intention as they can influence beliefs about behaviour and compliance with social norms (Vining & Ebreo, 1992). In an examination of the TRA, Bagozzi and Yi (1989) concluded that attitudes are mediated well by intentions when intentions are well formed, but that poorly formed intentions resulted in a more direct effect of attitudes on behaviour.

These theories have been used to investigate EPB performance.

Two US studies, and one Korean study, using the TRA to examine EPBs all found support for the theory. Durquette (1985) conducted telephone interviews with 380 respondents examining the elements of the TRA in relation to protecting the environment, and found that all relationships contained in the theory were supported, but that the relationships were weak. Goldenhar and Connell (1992/93) used the TRA to examine newspaper recycling behaviour in college residence halls. They found that intention was the best predictor of self-reported newspaper recycling, and that very specific attitudes about using the paper recycling system and subjective norms (belief that parents and friends thought the respondent should recycle) indirectly affected behaviour through intention. Hwang, Kim and Jeng (2000) used the attitude items ‘Forest is important because it is the origin of life’, ‘When I see the forest, I feel like relaxing in there’, and ‘I like to reside in forested areas’, in a study of willingness to take rubbish home from the forest by 523 visitors to a forest trail in Korea. They found that the TRA was supported, and that attitudes had a large total effect on the behavioural intention. In addition, a literature review by Thogersen (1996) found that most studies that use the TRA find a positive relationship between attitude toward recycling and intention to recycle, and a much weaker link with the social norm construct.

Three studies that used the TPB to examine EPBs found that the theory was partially supported, but that it was insufficient to explain the behaviours under investigation. An Australian study by Boldero (1995) asked 254 first year psychology students to observe the newspaper recycling behaviour of one member of their household and to then ask them to complete a questionnaire. This study examined a number of contextual factors in addition to the factors in the model of the TPB, being restrictions on storage space, lack of adequate number of newspapers to recycle, provision of a
council curbside recycling program, evaluation of that program, and past and current recycling behaviour. The study provided only limited support for the TPB. It found that intention to recycle newspapers was a significant predictor of this behaviour, but that other factors also need to be considered as part of this relationship. Of the attitudes assessed, the negative attitudes regarding the inconvenience of recycling and having a lack of conviction about the benefits of recycling were significant predictors of intent to recycle, whereas the positive attitude regarding the environmental benefits of recycling was not. Perceived behavioural control did not appear to be either a direct or indirect predictor of recycling behaviour. In addition, past behaviour and contextual factors (especially convenience) appeared to be significant contributors to the prediction of this behaviour.

Using the TPB as their theoretical base, Hamid and Cheng (1995) examined the EPB of signing an antipollution petition by 64 Chinese students in Hong Kong. They found that generally, the theory was supported but, again, that it was insufficient in the prediction of the behaviour. They also found that past behaviour was a significant direct predictor of intention to sign and on signing behaviour. In a study examining the behaviour of driving one’s car to university by German university students, Bamberg and Schmidt (2003) found that all elements of the TPB were supported, with the exception of perceived behavioural control having a direct effect on behaviour. They found, however, that elements of the Triandis’ (1977, 1980, cited in Bamberg and Schmidt, 2003) Theory of Interpersonal Behaviour could increase the predictive power of the TPB. In particular, they found that role beliefs (belief about how appropriate as a university student is it to use a car to travel to university) increased the explanatory power of intentions to use a car to travel to university, and car use habit significantly increased the power of the TPB to predict actual car use to university.

Although some support for the TRA and TPB has been collated in relation to the prediction of EPBs, these theories are considered insufficient for explaining EPB performance (eg. Boldero, 1995; Thogersen, 1996).

Attitudes included in studies of the TRA and TPB are so particular to the behaviour under examination that they can only predict that extremely specific behaviour, and they therefore become useless as predictive constructs of any other related behaviours, even very similar ones. An example may be that, using those models, examining an attitude about recycling milk cartons in a residential curbside recycling
program may predict the intention to recycle milk cartons in a residential curbside recycling program, but it may not provide information about an individual's intention to perform other types of similar recycling, such as recycling a milk carton at work, or recycling newspapers in a residential curbside recycling program. Therefore, these attitude models do not seem to be useful when attempting to predict a range or group of related EPBs.

Further, the relationship between intention and behaviour may be influenced by additional factors not contained in the theories. Intention is also unreliable over time (Boldero, 1995). Geller (1981), for instance, found a discrepancy between behavioural intentions at the end of a workshop on energy reduction, and actual behaviour change in the home at a follow up visit six to eight weeks later.

As noted above, the inclusion of additional factors can increase the predictive power of the TPB (eg, Whitmarsh & O'Neill, 2010). Being developed within the psychological domain, the TRA and TPB do not include contextual considerations, with the exceptions of social pressures being recognized in both theories, and 'perceived behavioural control' included in TPB. Rather, contextual factors are classified into a single group of external influence that needs to be controlled in order for the model to work. This approach shuts out the world in which the psychological processes outlined in the model occur. It thus becomes insufficient for predicting real-world behaviour.

The Theory of Planned Behaviour (TPB) was used to examine intention to perform EPBs in a workplace (Greaves, Zibarras and Stride, 2013). They found that TPB constructs were able to explain 61% of the variance relating to intentions to turn off computer screens when leaving the computer for more than an hour, 46% of the variance related to using video-conferencing in preference to travelling for meetings and 53% of the variance relating to recycling waste in the office. The authors believe that the high levels of variance explained in this study were due to very specific questionnaire items as well as having developed behavioural and belief questionnaires in close conjunction with staff so that the relevancy was high.

Further, this study examined beliefs that are antecedents to the three TPB variables of attitude, social norms and perceived behavioural control. They found that the antecedent beliefs were mediated by the three variables to affect intention. They were also interested to find that at least some of the antecedent beliefs could directly
predict intention. This lends support to the view developed in the current research that the structure of attitude theory may not be most appropriate theoretical framework from which to examine the motivation for the performance of EPBs. The antecedent beliefs could be categorized in the current research as belonging to one of a range of defined drivers of EPB performance. One example from the study is the direct influence on turning off computer screens of the length of time a computer will take to start up. This belief can be categorized as an element of ‘convenience’.

1.2.7.3 Concluding remarks regarding attitudes

The relationship between attitudes and EPBs appears to be a complex one. The high level of favourable attitudes toward the environment do not correlate highly with corresponding performance of EPBs. There are a number of possible reasons why the intuitive assumption that attitudes will lead to behaviour does not transpire. It may be due to researchers overlooking theoretical considerations such as matching the specificity of attitudes and behaviours or examining the strength of attitudes. It may be due to the methodological problems which plague many studies. It may be due to the fact that attitudes can be easily overridden by contextual factors. When the well-researched theories of TRA and TPB are used, some relationship between attitudes and EPBs is found, but these theories are insufficient to explain behaviour as they do not examine the influence of contextual factors. Behaviour may, indeed, be a more effective change agent for attitudes than vice-versa.

The link between attitudes and EPBs appears to be weak at best.

1.2.8 Values

The definition of ‘values’ in the current thesis is that of Schwartz (1994);

‘…desirable transsituational goals, varying in importance, that serve as guiding principals in the life of a person…’ (p. 21).

Values are discriminated from attitudes in that they are more general and abstract (Schwartz, 1992), and in that they are viewed as more stable principals. Values may inform attitudes.
Schwartz (1996) notes that values can motivate behaviour, but that they are unlikely to enter into consciousness and to be used as guiding principals unless there is 'value conflict', that is, a behaviour arises which has consequences which promote one value held dear by the individual, but may oppose another value that they hold dear. Further, Schwartz (1996) notes that behaviour is also influenced by contextual factors and thus it is often difficult to predict behaviour based on value priorities.

There are three well defined and well researched theories which predominantly inform the research on the connection between values and EPBs, being:

- The Theory of the Content and Structure of Values (Schwartz, 1994),
- The Theory of the Normative Influences on Altruism (Schwartz, 1977), and
- The Value-Norm-Belief Model (Stern et al., 1999).

Outside of these three theories there are a number of researchers who have examined various values in relation to EPBs.

1.2.8.1 The Theory of the Content and Structure of Values (Schwartz, 1994)

Building on the work of Rokeach (1973), Schwartz (1992, 1994) attempted to catalogue an exhaustive list of universal human values. The content of the theory is based on a study in which 25,863 respondents from 44 countries over every inhabited continent were asked to rate the importance of a list of values as guiding principals in their lives. Collaborators to the study were encouraged to add values that may be evident in their cultures if they were not included in the original list.

The analyses yielded a final list of 56 values, which can be organised into 10 'Value Types' (see Table 1.3).
Table 1.3

*Catalogue of values and their organisation into value types (Schwartz, 1994)*

<table>
<thead>
<tr>
<th>Value Types</th>
<th>Power</th>
<th>Achievement</th>
<th>Hedonism</th>
<th>Stimulation</th>
<th>Self direction</th>
<th>Universalism</th>
<th>Benevolence</th>
<th>Tradition</th>
<th>Conformity</th>
<th>Security</th>
</tr>
</thead>
</table>
Value Types are distinguished from one another by their motivational goals (Schwartz, 1996). For instance, the value type ‘power’ is characterised by the motivation to gain ‘[s]ocial status and prestige, control or dominance over people and resources’ (Schwartz, 1996, p. 3), and the value type ‘universalism’ is characterised by the motivation to achieve ‘[u]nderstanding, appreciation, tolerance and protection for the welfare of all people and for nature’ (Schwartz, 1996, p. 3). From the results of studies examining a number of behaviours Schwartz (1996) concludes that the priority given to a Value Type is a better determinant of behaviour than the priority given to single values.

Value Types, in turn, are clustered into two Value Indices, with two dimensions to each (Schwartz, 1994), being:

1. **Self-Enhancement versus Self-Transcendence.** This dimension is described by Schwartz (1994) as follows: ‘[It] opposes values emphasizing acceptance of others as equals and concern for their welfare…to those emphasizing the pursuit of one’s own relative success and dominance over others’ (p. 25), and

2. **Openness to Change versus Traditionality.** (Traditionality was originally labelled ‘Conservation’, but will be called ‘Traditionality’ in the current thesis, so as not to confuse the definition with that of the conservation of ecology, as per Stern, Dietz and Guagnano, 1995; Stern and Dietz, 1994). This dimension is described by Schwartz (1994) as follows: ‘[It] opposes values emphasizing own independent thought and action and favoring change …to those emphasizing submissive self-restriction, preservation of traditional practices, and protection of stability’ (p. 25).

The indices provide greater predictive power than individual values or value types (Schwartz, 1996).

Values are related to each other in a predictable manner and therefore can be organised into a consistent structure (Schwartz, 1994) (see Figure 1.3).
Figure 1.3. Schwartz’s (1994) Structure of human values

Figure 1.3. ‘Theoretical model of relations among motivational types of values, higher order value types, and bipolar value dimensions.’ Conformity and tradition share a motivational goal – ‘subordination of self in favor of socially imposed expectations’ (p. 24). Hedonism falls into both Openness to Change and Self-Enhancement equally. All other factors fall into specific orientations. Adapted from “Are there universal aspects in the structure and contents of human values?” by S.H. Schwartz, 1994, *Journal of Social Issues*, 50(4), p. 24.

The structure in Figure 1.3 recognises that values may be compatible with one another, or they may conflict with one another. For instance, benevolence may conflict with achievement, but be compatible with conformity as they both relate to acting in accordance with one’s peer group.

Individuals identify particular values as stronger or weaker guiding principals in their lives, or as being opposed to their guiding values, and can thus be classified as falling most comfortably in one of these segments. Individuals are likely to rate
adjacent values as next important and so on, until the segment opposite their
dominant segment, which is rated as opposing their principals (Schwartz, 1996). For
example, if an individual rates universalism as the most important guiding principal in
their life, they are likely to rate self-direction and benevolence as very important, and
power and achievement as least important. They are likely to have a Self-
Transcendent orientation as opposed to a Self-Enhancement orientation, and are
more likely to be Open to Change, rather than Traditional.

There are relaxed boundaries between value types, as adjacent value types have
similarities (Schwartz, 1994). The value types most relevant to EPB performance are
similar in that universalism and self-direction ‘...both express ... comfort with the
diversity of existence’ (p. 25), and that universalism and benevolence are ‘...both...
concerned with enhancement of others and transcendence of selfish interests’ (p.
25).

Research findings suggest that although the list of individual values is not universal, it
has been found to hold true across at least 41 countries (Schwartz, 1996), and the
two indices, as well as the compatibility and conflict relations among values, appear
to be near universal (Schwartz, 1994). Differing patterns of priorities assigned to
Value Types are found across cultures. The structure presented in Figure 1.3 is that
most aligned with Western countries (Schwartz, 1994).

Researchers have used elements of the Theory of the Content and Structure of
Values to examine precursors to EPBs.

Initial studies with undergraduate students indicate the existence of a smaller Value
Type that is specific to motivating environmental behaviours. Identification with a
construct comprising the three environmental items within the Universalism Value
Type has been found to predict the performance of EPBs across North and Central
America and Spain by Schultz and Zelezny (1998) who labelled it ‘Self-
Transcendence (Nature)’, and by Karp (1996) in a US study who labelled it
‘Universalism (Biospherism)’.
In their study examining the values of undergraduate college students from Mexico, Nicaragua, Peru, Spain and the USA, Schultz and Zelezny (1998) divided Self-Transcendence into:

- Self-Transcendence (Nature) - comprising i) protecting the environment, ii) a world of beauty and iii) unity with nature.
- Self-Transcendence (General) - comprising i) broadminded, ii) helpful, iii) honest, iv) forgiving and v) loyal.

The study found that Self-Transcendence (Nature) had a positive relationship with self-reported past EPBs (recycling, conserving energy, conserving water, purchasing environmentally friendly products) across all samples. Self-Transcendence (General) was significantly positive only for the US sample. Self-Enhancement had a negative relationship with self-reported past EPBs.

In a study of undergraduate students in Washington, Karp (1996) designed a four-dimensional construct comprising:

- Self-Transcendence/Openness to Change
- Self-Transcendence/Traditionality
- Self-Enhancement/Openness to Change
- Self-Enhancement/Traditionality

The study found that Self-Transcendence/Openness to Change had a significant positive effect on all EPBs tested (‘being a good citizen’, ‘an activist’, ‘a healthy consumer’ and a composite of these). Self-enhancement/Openness to change had no significant effects on EPB performance. Self-Enhancement/Traditionality was a negative predictor of activist and composite behaviours.

The Schwartz ‘Traditional’ and ‘Openness to change’ indicies appear to be less important in determining behavioural indicators for environmental protection (Stern & Dietz, 1994).

1.2.8.2 Theory of Personal Normative Influences on Altruism (Schwartz, 1977)

In a separate theory, Schwartz (1977, also Schwartz, 1968a, 1968b, 1970a, 1970b, 1973; Schwartz & Tessler, 1972) presented an empirically supported decision making theory to predict the performance of altruistic or moral behaviour, entitled the Theory of Personal Normative Influences on Altruism. Schwartz (1977) rejected the
prevailing social psychological motivation theories that insisted that altruistic
behaviour is motivated by potential rewards to the actor. Instead, he created the
concept of ‘altruistic motivation’, which he defined as referring to ‘…intentions or
purposes to benefit another as an expression of internal values, without regard for
the network of social and material reinforcements’ (p. 222).

EPBs have been conceptualized as altruistic behaviours by a number of researchers
created a concept of ‘environmental altruism’ as ‘…behavior that is done to benefit
the natural environment, motivated by an internal value, and without an expectation
of anything in return’ (p. 541). The Theory of Personal Normative Influences on
Altruism has thus been seen as suitable to study the expression of EPBs.

Central to the theory is the idea that every individual possesses a system of
internalised values and norms. These constructs are defined as per Williams (1968,
cited in Schwartz, 1977) as values being trans-situational standards of desirability,
and that norms prescribe behaviours. For example, the value ‘equity’ may influence
the norms of how one treats one’s spouse. Values and norms refer to ideal states.

Norms can be personal or social. Personal norms are defined as the expectations a
person has of themselves, and sanctions attached to personal norms are anchored in
the self-concept.

Social norms are the expectations that an individual supposes others have of them,
and they are believed to be activated by the threat of social sanctions. Schwartz
(1977) asserts that examining social norms adds little to the explanations of altruistic
behaviour, and that a behaviour can only be considered truly altruistic if it is tied to
personal norms.

The theory then asserts that in order for an individual to perform an altruistic act they
must first become aware that their behaviour can benefit the welfare of another
person. This is labelled Awareness of Consequences, or AC. When AC acts to
activate an individual’s internal system of norms and values, this results in feelings of
moral obligation, which may lead to an altruistic act being performed.

The process can be thwarted by an individual rationalizing inaction by denying
responsibility for the consequences of their behaviour, labelled Responsibility Denial,
or RD. RD acts as a defensive mechanism when perceived costs of the altruistic behaviour are high. It allows individuals to act against their values by denying moral responsibility, rather than via a lack of internalised values (Schwartz & Howard, 1980).

In summary, the theory states that if AC activates personal norms and RD does not occur to neutralize the feelings of moral obligation, the behaviour will follow, as represented by the diagram presented in Figure 1.4.

**Figure 1.4.** Diagrammatic representation of Schwartz’s (1977) Theory of Personal Normative Influences on Altruism

![Diagram](image)

**Figure 1.4.** The processes proposed by Schwartz (1977) that occur in a linear fashion to produce altruistic behaviour. Created from information contained in “Normative influences on altruism,” by S.H. Schwartz, 1977, in L. Berkowitz (Ed.), *Advances in Experimental Social Psychology: Vol. 10*, pp. 221-279.

An additional element of the theory outlined in an earlier paper, and subsequently eliminated from the model, is that of Ascription of Responsibility, or AR (Schwartz, 1970b). This element has been included in a number of later ERB studies using this theory (eg. Schultz & Zelezny, 1998). AR is a process whereby an individual decides on the extent that they themselves are responsible for the potential actions that could provide favourable consequences for another.

Schwartz (1977) noticed that in a number of studies, as conditions moved toward expected increases in altruistic behaviour (eg. the need of another was seen as high)
the expression of the altruistic behaviour often increased until a certain high point, where it began to decrease. Schwartz (1977) has called this the ‘Boomerang Effect’. He postulated that the Boomerang Effect may have been caused by a feeling of exploitation.

Some support for the theory in relation to EPBs has been assembled.

In a study examining recycling behaviour during the introduction of a curbside recycling program in the USA, Vining and Ebreo (1992) found that AC and social norms had direct effects on recycling, and that AC was a moderator of the personal norm-behaviour relationship. In addition, the study found that recyclers were more likely to feel a personal obligation to recycle. Another study examining a range of EPBs across a number of countries found that within a US sample only, high AC and high AR indicated a stronger relationship between Self-transcendence (Nature) and the performance of EPBs (Schultz & Zelezny, 1998). Van Liere and Dunlap (1978) conducted a study in Washington that used Schwartz’s norm-activation model to examine the drivers for ceasing the burning of rubbish in one’s yard, which was a topical environmental issue in the US at the time due to the polluting effects of the practice. The results of 403 telephone interviews indicated that residents with high AR were less likely to practice yard-burning than those with low AR, that is, those who believed that their personal yard-burning would directly contribute to pollution were less likely to burn. A relationship was also found between AC and yard-burning, but this result was not significant. The authors suggest that this may be because almost everybody was aware of the consequences of yard-burning as its negative effects had been heavily publicised shortly before the study was conducted. Thus, the authors suggest that those who continued to burn did so because they believed that they were not personally responsible for the consequences of their actions. AC and AR predicted low cost energy efficiency improvements to homes and lower thermostat settings in a study by Black et al. (1985). Finally, in a study examining the effect of ‘block leaders’ on residential recycling behaviour, Hooper and Nielsen (1991) found that personal norm scores and recycling behaviour were highly correlated when AC was high, but weakly correlated when AC was low. Thus, a personal norm for recycling was found to be related to recycling behaviour. Social norm scores, however, correlated highly with personal norm scores regardless of AC levels, and social norm scores had no independent effect on behaviour. The effect of social norms were mediated through personal norms. This supports the notion that recycling is an altruistic behaviour.
Contextual constraints have been found to present barriers to personal norms leading to EPBs (Black et al. 1985; Stern et al., 1983). Stern et al. (1983) found that personal norms were important for repeated energy saving behaviours (such as turning down a thermostat setting), but not for structural changes made to save energy. Personal norms had stronger effects on behavioural choices as structural constraints on behaviour decreased, causing the authors to postulate that norms may lack the strength to overcome structural barriers, a contextual influence.

As with attitudes, differences in the way that elements of the theory are measured in different studies may reduce the comparability of study results.

1.2.8.2b The Norm Activation Model (NAM)

Schwartz and Howard (1981) expanded the model significantly in a seminal book chapter in which they outlined the Norm Activation Model (NAM). Central to the theory, and differing from the then prevailing idea of social norms as the primary driver for all behaviour, is the idea that altruistic behaviours specifically are performed when personal moral norms become activated in response to a perceived need. Schwartz & Howard (1981) proposed the concept of personal moral norms for the purposes of this model to mean ‘...situated, self-based standards for specific behaviour generated from internalized values during the process of behavioral decision-making’ (p. 192). Similarly to the Theory of Personal Normative Influences on Altruism (Schwartz, 1977), norms are experienced as feelings of moral obligation to perform a behavior, and assessments are made by the individual based on anticipated emotions that they will feel should they perform or not perform the behaviour under consideration. That process is embedded in a wider decision-making process involving evaluation of non-moral costs and benefits and social norms. The model consists of 5 stages as follows.

1. Attention Stage
In order for an altruistic behaviour to be executed, the actor needs to be aware that another person (or entity, such as an old growth area of forest) requires help (measured by AC), recognize that there are actions that could help, and feel like they are able to provide the help (equivalent to ‘perceived behavioural control’).
2. Motivation Stage
In this stage, the actor very quickly generates a list of probable outcomes that would arise should they perform the altruistic behaviour that they are considering. This is where personal moral norms can become activated. According to the theory, personal norms are based on that individual’s particular set of value priorities. Personal norms are also influenced by social norms. Values (e.g. compassion) and social norms which are reinforced by rewards or sanctions (e.g. my friends would think me a bad person if I don’t help the person who has just fallen off their bike) lie latent until they are activated by an event into creating a personal moral norm (e.g. people should help others in need).

During this stage, in addition to the moral outcomes, the actor considers probable outcomes for their physical and non-moral psychological statuses, and the outcomes for other people.

3. Evaluation Stage
The probable outcomes generated in the Motivation Stage are evaluated in terms of cost/benefit weightings to the actor. If a decisive choice is able to made based on this evaluation, then behaviour will either occur or not occur. If there is some indecision, then the Defense Stage will be entered.

4. Defense Stage
In this stage, the actor may deny that the other actually requires help, that there is an effective action to help, that they have the capability to help or that they are personally responsible to provide the help. These thoughts of denial can weaken the feeling of moral obligation to help, and the actor may subsequently choose to not perform the considered altruistic behaviour.

5. Behaviour Stage
If the first three stages result in the affirmative, and defense does not occur, then an altruistic behaviour will be performed. If the first three stages result in the negative, or if defense occurs, then the altruistic behaviour will not be performed.

In recent years, researchers have combined this theoretical framework with other psychological theories in an attempt to create more comprehensive models to capture drivers of EPB performance (see Section 1.3.2).
1.2.8.3 The Value-Belief-Norm Theory of EPBs

Stern and colleagues (Stern, 2000; Stern & Dietz, 1994; Stern et al., 1999) have devised a value-based model to predict the performance of EPBs specifically. Using elements of Schwartz’s value theory (Schwartz, 1992, 1994), the Theory of the Normative Influences on Altruism (Schwartz, 1977) and the NEP (Dunlap & Van Liere, 1978), the Value-Belief-Norm Theory, or VBN, states that individuals move through a series of psychological events in a linear process, which lead to a ‘...general predisposition that influences all kinds of behaviour taken with pro-environmental intent’ (Stern, 2000, p. 413). The VBN is represented diagrammatically in Figure 1.5.
Figure 1.5. The Value-Belief-Norm Theory of Environmentalism

Values  Beliefs  Pro-environmental personal norms  Behaviours

Biospheric  Ecological worldview (NEP)  Adverse consequences for valued objects (AC)  Perceived ability to reduce threat (AR)  Sense of obligation to take pro-environmental actions  Non-activist public-sphere behaviours

Altruistic  (Activism)

Egoistic  (Behaviours in organisations)

Figure 1.5. General values lead to more specific beliefs which then lead to personal norms and finally to EPBs. Adapted From "Toward a coherent theory of environmentally significant behavior," by P.C. Stern, 2000, Journal of Social Issues, 56(3), p. 412.
The elements of the VBN move from stable personality constructs (values) through to more specific beliefs about human/environment interactions and then to feelings of moral obligation (Stern et al., 1999). Each variable in the chain directly affects the next, and may also directly affect variables further down the chain (Stern et al., 1999).

The theory proposes that people are inclined toward one of the following stable value orientations (Stern et al., 1993):
- **Egoistic** – valuing one’s own welfare most highly,
- **Altruistic** – valuing the welfare of other people most highly, or
- **Biospheric** – valuing the biosphere (ie. plants, animals and ecosystems) most highly.

Research findings subsequently suggested that there is no differentiation between the altruistic and biospheric orientations (Cameron et al., 1998; Stern, Dietz, Guagnano & Kalof, 1994, cited in Stern & Dietz, 1994; Stern & Dietz, 1994; Stern, Dietz, Kalof et al., 1995; Stern et al., 1999) and therefore people fall into two categories:
- **Egoistic** (this corresponds empirically with Schwartz’s (1994) self-enhancement orientation), and
- **Altruistic/biospheric** (this corresponds empirically with Schwartz’s (1994) self-transcendent orientation).

Schultz (2001), however, found empirical evidence for the existence of all three orientations among US college students, a US general population sample and in samples of college students from 10 countries across the Americas and Spain, and Stern (2000, Stern & Dietz, 1994) has suggested that a separate biospheric orientation may be emerging.

These orientations can coexist, with many people using a combination to motivate their behaviour. One guiding orientation will emerge as most salient depending on context (Stern et al., 1993).

The VBN states that these orientations interact with a series of beliefs in a linear process. They first interact with broad beliefs about human-environment interactions contained within the NEP. They next interact with AC from Schwartz’s (1977) Theory of the Normative Influences on Altruism in that individuals will become aware of the
consequences of their behaviour on the objects that they value most highly (that is, themselves, other people, or the biosphere). The third interaction is with AR, also from Schwartz’s (1977) Theory of the Normative Influences on Altruism, in that individuals then ascribe responsibility to themselves for taking the required action. The NEP is linked to the Theory of the Normative Influences on Altruism in that the NEP is seen as a ‘folk ecology’ through which beliefs about the consequences of environmental change can be deduced.

These interactions activate the personal norm for performing EPBs, that is, a feeling of moral obligation to perform EPBs. The final step is the performance of the EPB.

New information (eg. from scientific studies or publicity) can shape the beliefs included in the VBN, which in turn can influence personal norms and predispositions to EPB performance. Thus, personal norms are seen to be the largest predictor of the predisposition to EPBs (Stern, 2000).

The values most strongly implicated in activating pro-environmental personal norms are altruistic values and self-transcendent values, and negatively associated values are self-enhancement/egoistic and traditional values (Stern et al., 1999). A similar finding emerged from a study by Schultz (2001) in which a positive relationship was found between holding biospheric concerns and self-reported performance of EPBs, but not between altruistic concerns and EPBs. One possible mechanism for this finding is that those with an altruistic/biospheric orientation may be more sensitive to believing information about harm to the environment, and that those with strong traditional values tend to deny or ignore this information (Stern et al., 1995).

The VBN has been empirically tested and found to be a better predictor of non-activist support for the environmental movement, compared to three other prevalent theories (Cultural Theory which proposes that environmentalism arises from those with an egalitarian orientation being fearful of environmental threats, a Theory of Post-Materialist Values, and belief in the sacredness of nature) (Stern et al., 1999), and of non-activist EPBs (Stern, 2000). Personal norms were the best direct predictor of environmentally preferred consumer behaviours, environmental citizenship and policy support (Stern et al., 1999).
As with other value theories, there are many and varied contextual and other psychological factors which may intervene in the VBN processes to prevent the performance of an EPB (Stern 2000; Stern et al., 1999). Stern (2000) suggests that these factors may be more important predictors of behaviour as the VBN predicts intent, which can be thwarted by the other factors.

Interestingly, study of the VBN has found that activist EPBs appear to have different motivating forces to non-activist EPBs (Stern et al., 1999). Values were found to be indirect predictors of a number of non-activist EPBs, but they were direct predictors of activist behaviours such as taking part in a protest. Personal norms, which were found to be the largest predictors of non-activist behaviours, did not predict activist behaviours.

1.2.8.4 Other research on values and their relationship to EPBs

A large range of concepts relating to the value construct have been investigated in relation to EPB performance.

A number of studies have investigated the relationship between constructs similar or equivalent to Stern and colleagues' biospheric/altruistic and egoistic orientations (Stern, Dietz, Kalof et al., 1995; Stern et al., 1999) and EPB performance. Overall, studies demonstrate that those with a biospheric orientation are more likely to engage in EPBs than those with an egoistic orientation. Findings on altruistic orientation varies. Anthropocentrism has been found to correlate negatively with self-reported EPBs (Schultz et al., 2000) and people have been found to be more likely to be concerned for the environment if they see themselves as part of the biosphere (Schultz, 2000). Axelrod (1994) asked students to respond to hypothetical ecological dilemmas and found that those with a universal (betterment of the world) orientation were more likely to report that they would engage in the environmentally preferred option presented than those in an economic group. The responses of those in a social-orientation group varied depending on the social context presented in the dilemma. A study by Cameron et al. (1998) found that students with a pro-social/environmental orientation were more likely to support a car-use reduction program that had been described in terms of environmental benefits and personal costs, than those with a pro-self orientation.
In a survey study across 10 Western countries, Rasinski et al. (1994) found that pro-social values were associated with higher levels of support for environmental spending than pro-business and government responsibility values. A factor labelled ‘economic orientation’ focusing on the costs of EPBs was found not to have a strong relationship with the performance of EPBs (meta-analysis by Hines et al., 1987).

Ebreo and Vining (2001) found, through factor analysis of interview data, three justifications for engaging or not engaging in waste reduction or recycling behaviours, being:

- An altruism/internal factor – ‘…reasons for reducing waste that are related to environmental protection, one’s internal values, and affect, or community involvement’ (p. 433),
- A lifestyle/social factor – ‘…reasons against recycling that are related to hindrances to one’s lifestyle or other barriers to engaging in waste-reduction activities or to various social influences’ (p. 433), and
- An economic/external factor – ‘…reasons to recycle that are related to economic concerns or externally based normative expectations’ (p. 433).

Ratings of these justifications could predict recycling behaviour (those rating altruism highly were more likely to engage in the convenient act of recycling), but not waste reduction behaviour, which required more effort. When examining waste reduction behaviours, however, concern for the environment was rated as the most important reason, and that economic and social incentives were rated as less important.

In a number of studies self-orientation was defined as valuing convenience, for example, personal costs preventing support of a program to reduce car use in favour of car-pooling or public transport (Cameron et al., 1998) or perceived inconvenience preventing recycling (Ebreo & Vining, 2001; Ewing, 2001).

One aspect of self-orientation, that of valuing money, appears to be a particularly powerful influence in the prevention of the performance of EPBs (eg. Axelrod, 1994; Ewing, 2001; Finger, 1994). Axelrod (1994) has suggested that those with a biospheric orientation may be more likely to pursue EPBs even when economic costs are involved.

The results of a small number of studies indicate that a value orientation focusing on the self may be a more powerful predictor of the performance of EPBs (as a negative
relationship) than a social or environmental orientation. Perceptions of personal costs were a more powerful predictor of support or opposition to a program requiring college students to reduce their car use by car-pooling or using public transport, than were perceptions of the environmental benefits of the program in a study by Cameron et al. (1998). This was despite equivalent perceptions of both personal costs and environmental benefits of the program by participants in pro-self or pro-social/environmental classifications. Ewing (2001) found that egoistic motives around inconvenience were a larger predictor of participation in a curbside recycling program than altruistic motives. Biospheric or altruistic orientations, however, are clearly still important. Altruism (measured as the belief that recycling helps to protect the environment) was found to affect whether or not people recycled at all in the study by Ewing (2001).

In terms of the personal norm concept as described in the VBN as a feeling of moral obligation to perform EPBs, Thogersen (1993) concluded from a study on waste behaviours that personal norms regarding household recycling and avoiding packaging waste do appear to both be rooted in an individual's set of values.

There are other conceptions of values outside these theories that have been investigated. Holding voluntary simplicity values has been found to be associated with a reduction in energy use (review by Olsen, 1981), and placing a high value on ‘family security’ and a low value on ‘a comfortable and exciting life’ has been found to correspond with a reduction in gasoline use (Pitts et al., 1981). A study by Zimmerman (1996) found that an inclination to be attracted to natural, as opposed to built, environments did not affect support for environmental causes, but that those who were concerned about human intervention in the natural environment and were inclined against human domination over nature were more likely to support environmental causes.

Consideration of the future has also been found to affect EPB performance. Consideration of the future consequences of one’s own actions has been found to predict recycling behaviour, but not other waste reduction behaviours (Ebreo & Vining, 2001), and expectations of future direct personal consequences were found to be the largest factor in support for energy saving policies in a review by Olsen (1981).
Differentiated environmental value orientations can predict environmental activist behaviours, and those who believe in a sense of environmental injustice have been found to be more likely to perform these types of behaviours (Finger, 1994).

One possible mechanism by which values might lead to EPB performance is that individuals expect to feel good when acting in accordance with their deeply held values, as opposed to gaining economically or socially (Axelrod & Lehman, 1993). Other considerations may at times compensate for the discrepancy between values and behaviour to prevent EPB performance (Jacob & Brinkerhoff, 1997).

Again, context has been found to be an important consideration when examining the link between values and EPB performance. Contextual factors can sway behaviour, for example Corraliza and Berenguer (2000) found that physical facilitation was a more influential predictor of EPB performance than a sense of obligation to perform EPBs. In addition, the salience of particular values varies depending on the context (Seligman, Syme & Gilchrist, 1994).

As discussed earlier, EPB performance may lead to the formation of environmental attitudes rather than the other way round which would be expected intuitively, but at least one study has not found this to be true for values. Thogersen (1993) found that recycling did not increase the salience of environmental values.

1.2.8.5 Values as indirect influences on behaviour

Some evidence suggests that values may have an indirect influence on EPBs. This may be via attitudes (Cameron et al., 1998; McCarty & Shrum, 1994; Stern et al., 1985/86), or via personal norms (Black et al., 1985).

1.2.9 Environmental knowledge

Environmental knowledge is defined here as possessing and understanding information about the natural environment and threats to the natural environment, based on current scientific understanding.

Many studies have found a connection between higher levels of existing environmental knowledge and higher rates of EPB performance (meta-analysis by Hines et al., 1987). Recycling behaviour has been found to be associated with
general conservation knowledge (Arbuthnot, 1974; Oskamp, 1995b; Oskamp et al., 1991), acknowledgement of environmental problems (Oskamp et al., 1991) and a belief in the effectiveness and benefits of recycling (Oskamp et al., 1998). In addition, reducing emissions has been found to be associated with understanding the causes of climate change (O’Connor et al., 2002), pumping boat sewerage at a pumping station rather than offshore has been found to be associated with knowledge of the damaging effects of raw sewerage on water quality (Cottrell & Graefe, 1997) and knowledge about the role of the forest had a small effect on visitors’ willingness to take their own rubbish home from the forest (Hwang et al., 2000). General measures of EPB performance have also been found to be associated with higher environmental knowledge (Cottrell, 2003; Cottrell & Graefe, 1997; Tikka et al., 2000) and a perception that the natural environment is facing problems (Pelletier, Dion, Tuson & Green-Demers, 1999).

Some research findings, however, have not supported the connection between higher environmental knowledge and increased levels of EPBs. Various studies have found that EPBs were not predicted by higher levels of environmental knowledge (Finger, 1994) or by being more aware of, and knowledgeable about, environmental issues (Pickett et al., 1993), and were only weakly predicted by ‘environmental sensitivity’ (Sivek & Hungerford, 1990). Vining and Ebreo (1992) found that recyclers and non-recyclers equally understood the connection between recycling and its environmental benefits and agreed that every household, including their own, contributed to the waste problem. Environmental knowledge, including perception of the risk posed by environmental problems, was found to not have a strong link with EPB performance in a study by Whitmarsh and O’Neill (2010). One study even found that some types of knowledge seemed to be associated with lower EPB performance (Chan & Yam, 1995). Finger (1994) suggests that seeking reassuring information about environmental issues from the media may act as a substitute for taking social action to solve problems.

Specificity of knowledge may be an influential consideration. Knowledge about one area of the natural environment may not influence EPB performance in another area. Ewing (2001) found that knowledge of the level of sewerage treatment in the local area, about the causes of global warming, and awareness of environmental issues in the media did not affect recycling rates in a curbside recycling program. When the information and behaviour were aligned, there was a correspondence, that is, those
best informed about the causes of global warming were more likely to be willing to pay a user fee for the amount of rubbish they produced.

It is possible that knowledge affects EPB performance by acting as a mediator between attitudes and behaviour (Arbuthnot and Lingg, 1975). An Australian study found that environmental concern was found to be the mediator between environmental knowledge and behaviour (Hampel et al., 1996).

Despite the mainly positive evidence linking environmental knowledge and EPB performance, providing environmental information alone as a strategy to increase EPBs has overwhelmingly been found to be ineffective in increasing their performance (review by Costanzo, Archer, Aronson & Pettigrew, 1986; Hungerford & Volk, 1990; McKenzie-Mohr & Smith, 1999; Stern, 1992). For example, two US studies found that providing a flyer encouraging paper recycling was virtually ineffective in producing the desired behaviour for college students (Witmer & Geller, 1976). Although the provision of environmental information alone has been found to be ineffective, when provided in conjunction with other educational strategies, it does appear to increase EPB performance (Hines et al., 1987; Stern, 1992).

The depth of understanding about environmental issues has been found to be low in Australia (Hampel et al., 1996).

1.2.10 Procedural knowledge

‘Procedural knowledge’ is defined here as knowledge about how to perform specific behaviours. For example, procedural knowledge regarding curbside recycling may include knowing which items can and can not go in the bin for collection, then knowing which day to put the bin on the curb for collection. This type of knowledge is distinct from knowledge about the environment itself and from knowledge about environmental issues (Weigel, 1985).

Possessing procedural knowledge is a necessary precursor to performing EPBs, that is, if an individual is unaware of the action to be performed (eg. does not know that recyclables are collected from their curbside on a Tuesday morning), he or she can not perform the action, regardless of the influence of any other factors. The importance of this factor may be underestimated because it is often assumed that people know how to perform particular EPBs. Telephone interviews with US
householders revealed that many respondents did not know that certain behaviours were environmentally friendly, such as avoiding plastic containers when purchasing food (Tracy & Oskamp, 1983/84).

Overwhelmingly, higher procedural knowledge has been found to be associated with higher performance of EPBs in both self-reported behaviours (eg. meta-analysis by Hines et al., 1987; review by Oskamp, 1995b; Sia et al., 1986) and observed behaviours (eg. DeYoung, 1988/89). There are a small number of studies which show exceptions (eg. Lindsay & Strathman, 1997).

Procedural knowledge about recycling programs has been found to be an important predictor of recycling behaviour (eg. review by Schultz et al., 1995; DeYoung, 1988/89; DeYoung, 1990; Gamba & Oskamp, 1994; Oskamp, 1995b, Oskamp et al., 1998; Vining & Ebreo, 1990). DeYoung (1990) analysed data collected by six recycling education programs in Michigan and found that a lack of knowledge about how to recycle was the largest barrier to recycling behaviour. Similarly, Gamba and Oskamp (1994) found that knowledge about which materials could be recycled in a new recycling program, as well as knowledge about which materials could be recycled in the previous program, was the strongest predictor of the frequency of observed participation in a new curb-side recycling program. Knowledge of the overall recycling process, for example knowing what kind of container to store waste in, was also found to be a predictor of recycling behaviour in a study by DeYoung (1988/89). He believed that a lack of knowledge about the recycling process led to perceptions of difficulty and prevented people from attempting it. Oskamp et al (1991), using telephone interviews one year after the introduction of a curbside recycling program, found that procedural knowledge about a range of conservation behaviours predicted curbside recycling behaviour. Lindsay and Strathman (1997), however, did not find this factor to have any predictive power on recycling behaviour.

Procedural knowledge regarding how to reduce energy use has been found to be an important predictor of household energy conservation behaviour (Rosson & Sweitzer, 1981; Winett, Leckliter, Chinn, Stahl & Love, 1985; Winett, Love & Kidd, 1982/83). Seaver and Patterson (1976) found that providing householders with a decal stating ‘We are saving oil’ helped to reduce the oil consumption of householders only when participants already knew how to save oil. One study that did not find an effect of procedural knowledge on an energy-saving EPB was Bachman and Katzev (1982),
which found that providing bus route and schedule information to car drivers did not increase their bus ridership.

The power of providing procedural knowledge in changing behaviour to more environmentally preferred options may be enhanced by supplementing the information with additional techniques (review by Geller, 1981). These may include monetary rebates (review by Geller, 1981), or by presenting more detailed explanations of the information provided, as in the case of energy rating stickers on large appliances (Anderson & Claxton, 1982; Redinger & Staelin, 1981, cited in VanRaaij & Verhallen, 1983). Demonstrating energy reduction techniques in people’s own homes has also been found to increase the effectiveness of providing procedural information in increasing the environmentally preferred behaviour (Geller, 1981; Winett et al., 1985).

Procedural knowledge may be an important precursor to self-efficacy, another important predictor of EPB performance (see Section 1.2.11). Sivek and Hungerford (1990) found that feeling empowered by perception of skill level possessed can be increased by instruction regarding how to perform particular behaviours. In addition, in a study of Taiwanese schoolteachers, two of the three most important predictors found for EPB performance were ‘perceived knowledge of environmental action strategies’ and ‘perceived skill in using environmental action strategies’ (Hsu & Roth, 1999).

The confidence that one possesses the requisite skills to perform a behaviour has been found to be a predictor of a number of EPBs including curbside recycling (Lindsay & Strathman, 1997), responsible pumping of sewerage from boats (Cottrell & Graefe, 1997), and in studies looking at groups of EPBs (Axelrod & Lehman, 1993; Sia et al., 1986; Sivek & Hungerford, 1990). Individuals have also been found to be less likely to perform EPBs if they believe that they do not have the capability to perform the behaviours (Pelletier et al., 1999).

1.2.11 Self-efficacy

Self-efficacy is defined here as a feeling of empowerment possessed by an individual. There are two dimensions to self-efficacy in relation to EPBs. The first is the confidence in one’s own ability to successfully perform the behaviour and the second is the belief that the performance of the behaviour will have a real and
significant impact on the natural environment (Lindsay & Strathman, 1997). Confidence in one’s own ability to perform the behaviour successfully is closely related to procedural knowledge and has been included in that section (section 1.2.10). The current section focuses on the belief that one’s own behaviour will positively impact on the environment. Studies have overwhelmingly found that self-efficacy is an important predictor of EPB performance. Different aspects of self-efficacy appear to be important in different ways.

One way self-efficacy can be measured is via the psychological construct of locus of control (LOC). LOC describes an aspect of personality on a continuum, from an individual believing that they have complete control over the events in their lives (that is, they feel empowered), labelled internal LOC, to a belief that their life is controlled by people and events around them, labelled external LOC (that is, they feel disempowered). Numerous studies have found a positive relationship between having internal LOC related to environmental problems and EPB performance (Arbuthnot, 1974; meta-analysis by Hines et al., 1987; review by Schultz et al., 1995; Sivek & Hungerford, 1990; Tucker, 1978). Gamba and Oskamp (1994), however, found that environmentally specific LOC did not predict curbside recycling, and a study examining willingness to sign an antipollution petition by college students in Hong Kong found that LOC had no predictive power for either behavioural intention or actual behaviour (Hamid & Cheng, 1995). The authors suggest that this may be due to sampling error or cultural factors. More difficult behaviours have been found to be perceived as less under one’s control (Schultz & Oskamp, 1996).

Greater belief in the positive impact of EPBs on the environment has been found to predict general EPB performance, and higher perceived effectiveness of recycling has been found to predict curbside recycling (Gamba & Oskamp, 1994). Providing feedback to people regarding their performance of EPBs may lead to increased self-efficacy as it may demonstrate to them that their behaviour is having an impact. Studies have repeatedly shown that providing feedback to householders regarding their energy savings leads to further energy saving behaviours being performed (eg. Seaver & Patterson, 1976).

Hwang et al. (2000) surveyed 523 visitors to a forest trail in Korea. They measured the relationships among a range of factors related to the behaviour of taking one’s rubbish home from the forest, rather than leaving it there as litter. They examined LOC, which they measured on Likert scales with the following items – ‘If I participate
in activities for forest conservation, the situation will be improved’, ‘My recycling wood products will be helpful for forest conservation’, ‘My participation in public hearings cannot improve forest conservation’, and ‘There is nothing to do for me to prevent big companies destroying the environment’. The results of the study indicated that self-efficacy was the most influential (attitudes, personal responsibility and knowledge were also measured) in predicting intention to take rubbish home from the forest, and that the effects were direct. In a study of mainly male boat owners, Cottrell and Graefe (1997) found that personal commitment to issue resolution was positively related to a general measure of environmental behaviour (eg. of question – To what extent do you feel that you personally can influence the solution to water pollution).

In addition, studies have variously found that people are less likely to perform EPBs if they believe that certain behaviours are not effective in producing their desired outcome, including feeling daunted by the enormity of the environmental situation (Pelletier et al., 1999). Individuals have been found to feel disempowered in relation to environmental issues (Arbuthnot, 1977; Finger, 1994).

The notion of ‘collective self-efficacy’, that is, ‘a group’s shared belief in its conjoint capabilities to organise and execute the courses of action required to produce given levels of attainments’ (Bandura, 1997, p. 447, cited in Koletsou & Mancy, 2011, p. 191) has recently been explored as a possible driver of EPB performance (review in Koletsou and Mancy, 2011). Collective self-efficacy may be a more useful construct than individual self-efficacy to investigate in relation to EPBs, as environmental problems are typically large scale and require collective behaviour to mitigate. This is a new construct in relation to EPB performance and is not yet well defined or investigated (Koletsou & Mancy, 2011).

1.2.12 Connection to the environment

‘Connection to the environment’ is defined here as a feeling of personal connection with nature. It can loosely be divided into a ‘spiritual connection’ to the environment, defined here as a feeling of oneness with nature, and an ‘emotional connection’ to the environment, defined here as the presence of an affective investment in the natural environment.

The few studies examining the notion of connectedness with the environment indicate that its presence does correlate with increased EPB performance (Sia et al.,
There has been a heavier focus on emotional connection. Concern for the environment has been found to motivate people to recycle (review by Oskamp, 1995b). Emotional connection to areas of land was significantly related to general EPBs in a study of teenagers who had participated in local, natural resource-based work summer programs (Vaske & Kobrin, 2001), and a Hong Kong study found that the affective component of the Maloney and Ward ecological scale was a large predictor of self-reported EPBs (Chan & Yam, 1995). In addition, attitudes have been found to be better predictors of EPBs where there is also the presence of emotion relating to the environment (Pooley & O’Connor, 2000). One study that examined a more spiritual connection found that gardening, a physical manifestation of connectedness to the environment, was associated with being more likely to recycle (Ewing, 2001).

There is some sparse evidence downplaying the importance of this factor. One study found that conservation behaviour was not predicted by emotions about the effects of pollution on individual’s lives (Pickett et al., 1993). Two studies found a positive effect of connection to the environment on EPB performance, but that it was a less powerful predictor than other factors; Pitts and Wittenbach (1981) found in a telephone survey that only 5% of respondents ranked concern about the national energy crisis as the most important factor in insulating their home, and Ewing (2001) found that an expression of concern about environmental degradation was less effective in predicting willingness to pay a fee for the amount of household garbage produced than environmental knowledge and behaviour changes.

This factor may be similar, but not identical, to constructs described in the ‘values’ section of this chapter, being Stern’s biospheric orientation, self-transcendence(nature) as well as some elements of the NEP. Schultz (2001) found a positive relationship between people who feel that they are interconnected with nature and those with a biospheric orientation.

1.2.13 Past behaviour

Past behaviour is defined as having previously performed the same behaviour as that under investigation. If the behaviour has been performed regularly it can be labelled ‘habit’.
Initial research on prior performance of EPBs found that having performed EPBs in the past can predict future performance. This has been found for a group of EPBs (Hamid & Cheng, 1995), for recycling (Bagozzi & Dabholkar, 1994; Boldero, 1995; Goldenhar & Connell, 1992/93), and for car use (Bamberg & Schmidt, 2003). In recent years, this construct has been studied more extensively with more complex results.

A number of studies have demonstrated that the strength of the habit affects the size of its influence on EPB performance. Verplanken (2006, cited in Jorgensen et al., 2013) conducted a study in which habit strength mediated the effect of past behaviour on future behaviour. A study conducted in Germany by Klockner and Matthies (2004) examined the influence of normative decision-making (based on the work of Schwartz & Howard, 1981, see Section 1.2.8.2b) and habit on travel-mode choice, being a choice between using a private vehicle or one of a more environmentally preferred option of public transport, cycling or walking. The study found the strength of the habit of using the private vehicle was a moderating factor between personal norm and the travel mode chosen. A study of Swedish motorists (Erikson, Garville & Nordlund, 2008) found that the strength of car-use habit was more highly correlated with car-use behaviour than was a personal norm as measured by likert responses to the statement 'I feel morally obligated to reduce my car use in order to decrease the negative effects on the environment'.

Adding habit to existing theories increases their predictive power. The variable ‘past behaviour’ was found to extend the efficacy of the TPB on predicting intention to perform carbon-offsetting behaviours (Whitmarsh & O’Neill, 2010), and the variable ‘habit’ added predictive power to the TPB in a study examining travel mode choice (Donald, Cooper & Conchie, 2014). Nordfjaern, Simsekoglu and Rundmo (2014) conducted a study with an urban population in Norway that examined the role of habit in the choice between car use and public transportation use. The authors were interested in investigating whether choosing public transportation (an EPB compared to car use) was habitual or more deliberate. They found that while habit was significantly negatively related to public transport use, that the TPB was able to explain a much higher percentage of the variance in predicting this behaviour. These findings suggest that it would be useful to incorporate habit into wider models, rather than examining it in isolation. Further, it lends support to the idea that a theory that combines multiple factors can better explain behaviour motivation that one that incorporates a single, or only a few, factors.
An interesting characteristic of habit is that it appears to be consistent when the context is unchanging and to be more open to a change in behaviour from a habitual one when the context changes (Verplanken, Walker, Davis & Jurasek, 2008).

1.2.14 Personal responsibility for environmental problems

Personal responsibility for environmental problems is defined here as possessing a feeling of personal responsibility for contributing to environmental problems.

A handful of studies have inconclusively examined the link between a feeling of having some personal responsibility for environmental problems and EPB performance. A North American study found that individuals were more likely to voluntarily curb their energy use if they believed that they could accept some of the responsibility for the situation, as opposed to believing the crisis was solely caused by governing bodies and industry (Belk, Painter & Semenik, 1981). A Canadian study, however, found that householders who believed that the government was responsible for the energy crisis were more efficient energy users (Rosson & Sweitzer, 1981) and a Korean study found that a feeling of some personal responsibility for the destruction of forests had only a very small effect on forest visitors’ willingness to take their rubbish home from the forest (Hwang et al., 2000).

1.2.15 Intrinsic motivation

Intrinsic motivation is defined here as experiencing satisfaction from the act of performing EPBs.

Different types of intrinsic motivation have been found to influence EPB performance. Recycling behaviour has been found to be positively predicted by gaining a sense of satisfaction from saving natural resources and helping to solve a national problem (Gamba & Oskamp, 1994; Oskamp et al., 1991), from protecting the environment, helping charities and because it’s the right thing to do (DeYoung, 1990) and from being frugal, participating in community life, possessing a sense of self-sufficiency and possessing a sense of self-reliance (DeYoung, 1985/86; 1986). In addition, those higher in recycling behaviour have been found to gain less satisfaction from living a life of prosperity (DeYoung, 1985/86; 1986). Similar findings have been found for reusing behaviours (DeYoung, 1985/86, 1986).
A broader range of EPBs can also be predicted by different types of intrinsic motivation, including the motivation inherent in performing the EPB itself (DeYoung, 1985/86, 1986; Villacorta et al., 2003), from being frugal and from participating in purposeful activities (DeYoung, 1996; 2000). DeYoung (2000) included an additional value of the satisfaction gained from practicing competencies when performing EPBs being associated with the performance of a range of EPBs. This was found to be an important factor, and that when people cannot advance or use their competence, they avoid the situation because they find it unpleasant.

Self-Determination Theory (Deci & Ryan, 1985, cited in Green-Demers et al., 1997), a theoretical framework used to examine intrinsic motivation, has been used by a number of researchers to examine EPB performance. The theory states that there is a continuum of self-motivation. At one end is intrinsic motivation, which is satisfaction from performing the behaviour itself. Integrated regulation is adjacent, where the behaviour is valued to such an extent that it becomes part of the self-concept. Identified regulation is next, where outcomes of behaviour are congruent with values. Next along the continuum is introjected regulation, where there are internalized forms of external constraints such as guilt. Finally, on the other end is extrinsic motivation, where external constraints such as rewards and punishments compel behaviour. In addition, amotivation describes a state where behaviour is mechanically performed.

Studies using this theory have found it to be a useful predictor of EPB performance in that those higher on intrinsic motivation are more likely to perform EPBs. A Canadian study using this theory found that having motives freely chosen by the individual was a predictor of performing and sustaining EPBs (Seguin et al., 1999), and another study found that higher levels of self-determination had a significant relationship with the frequency of recycling, environmentally preferred purchasing and educating oneself regarding the environment (Green-Demers et al., 1997).

Intrinsic motivation is commonly contrasted with extrinsic motivation, defined as performing a behaviour to gain an externally offered incentive. Studies have repeatedly found that although individuals do increase their performance of EPBs in response to external incentives such as rewards, prizes or monetary incentives, the behaviour ceases when the incentive is removed. This pattern of behaviour has repeatedly and consistently been found for a range of EPBs (Ingram & Geller, 1975;
review by Katzev & Johnson, 1984; Oskamp, 1995b; Porter et al., 1995; Schultz et al., 1995; Seguin et al., 1999; Witmer & Geller, 1976). Behaviour performed for intrinsic satisfaction, however, is sustained (eg. Seguin et al., 1999). Researchers have attempted to explain the cessation of behaviour following the removal of an incentive by an ‘overjustification effect’, which states that the individuals may attribute their behaviour to the external incentive which then blocks the development of internal motivation (Arbuthnot et al., 1976/77; Burn, 1991; Katzev & Johnson, 1984; Pardini & Katzev, 1983/84; Thogersen, 1996).

A review by DeYoung (1984) notes that extrinsic motivation will only extinguish intrinsic motivation if an incentive is rewarded irrespective of the individual’s degree of success, that is, if an incentive is based on performance (eg. depending on how much energy is saved), a reward may enhance intrinsic motivation.

1.2.16 Identity

A factor that has been explored in recent years by Whitmarsh and colleagues is that of identity (eg. Whitmarsh, 2009, Whitmarsh & O’Neill, 2010). Self-identity has been defined as a label that an individual uses to describe themselves, and it is based on personal motivations (eg. for self-understanding) as well as social interactions (eg. expectations of others) (Whitmarsh & O’Neill, 2010).

As self-identity is a part of an individual, it may stay consistent across situations and behaviours and may be able to predict consistency in performing a range of EPBs across situations. Some EPBs have been found to be linked to self-identity (review in Whitmarsh & O’Neill, 2010).

Whitmarsh and O’Neill (2010) investigated the link between self-identity and intention to perform carbon offsetting behaviour. Their research, using questionnaires administered to householders in the UK, found that self-identity extends the predictive power of the TPB for the behaviour of ‘carbon offsetting’, but that this influence may not spill over into influencing other types of EPBs. The same study found that general pro-environmental self-identity was a strong predictor for the performance of particular clusters of EPBs (waste reduction, water and energy conservation and eco-shopping and eating), and that the NEP scores (classified in the current manuscript as ‘attitudes’) did not predict these behaviours (Whitmarsh & O’Neill, 2010). This was most powerful when the self-identity was specific to the
behaviour, that is, when an individual saw themselves as someone who would perform carbon-offsetting behaviours, but there was also a link with a more general self-identity as a person who would protect the environment.

In addition, this study found that general pro-environmental self-identity varied in strength in predicting a range of EPB types. The authors note that these results suggest that while self-identity is an important driver of EPB performance, that other factors interact and may overwhelm this factor, such as contextual variables or demographics (which were found to be predictors in their study). There may be competing identities, for example, identity as a jetsetter may override pro-environmental self-identity (Whitmarsh & O’Neill, 2010).

It is possible that, similar to the phenomena that performing a behaviour can influence an individual’s attitudes toward that behaviour, self-identity may orient more strongly toward environmental protection after EPBs are performed as a result of the influence of drivers other than self-identity. This has some support from one study that found that after a charge for single-use shopping bags was introduced in Wales, an increase in self-reported identity as environmentally oriented emerged, although this was not a statistically significant finding (Poortinga, Whitmarsh & Suffolk, 2013).

Social identity also appears to play a role in choosing to perform EPBs. Duke (2010), for example, found that the more participants discussed EPBs in a group, the more they participated in those behaviours one week later, regardless of the values they held before the discussions. This set of studies also found that positive intergroup comparisons resulted in an increase in individual’s intention to perform EPBs and negative intergroup comparisons resulted in a decrease in individual’s intentions, but that intra-group comparisons had the opposite effect. Interestingly, intra-group comparisons were mediated by shared responsibility, whereas the intergroup comparisons were mediated by environmental value centrality. In an Australian study with university students Dono, Webb and Richardson (2010) found that social identity (measured with the ‘social identity scale’ by Brown et al., cited in Dono, Webb & Richardson, 2010) was significantly linked with the performance of EPBs (using the ‘pro-environmental behaviour scale by Stern et al., 1999, cited in Dono, Webb & Richardson, 2010, which measured consumer behaviour, willingness to pay and environmental citizenship), and that there was a weak and indirect link between social identity and environmental activism.
1.2a Organization-based behaviour

The drivers for performing EPBs in a workplace setting may differ to those that drive EPB performance within other settings such as a private home (Greaves, Zibarras & Stride, 2013). There has been some research examining EPB performance specifically within organizations in recent years.

Paille and Boiral (2013) used the concept of ‘Organizational Citizenship Behaviour for the Environment’ (OCBE) to capture EPBs performed within workplaces in Canada. The results of their research found support for a three-factor model of OCEB being eco-helping, eco-civic engagement and eco-initiatives. Further, their results found that OCEB is related to, but distinct from, the more general construct of ‘Organizational Citizenship Behaviour’ (consisting of helping, civic virtue, and sportsmanship). The study then used Social Exchange Theory to investigate the drivers for OCEB performance. Social Exchange Theory explains behaviour motivation as ‘the voluntary actions of individuals that are motivated by the returns they are expected to bring and typically do in fact bring from others’ (Blau, 1964, p. 91, cited in Paille & Mejia-Morelos, 2014, p. 124). Paille and Boiral (2013) found that, consistent with Social Exchange Theory, perceived organizational support did in their sample lead to OCEB performance, but indirectly. There was a positive relationship between ‘perceived organizational support’ and ‘commitment to the organization’, which then led to OCEB performance. The relationship between ‘perceived organizational support’ and ‘commitment’ was mediated by ‘job satisfaction’. While they found that ‘perceived organizational support’ also directly led to increased ‘job satisfaction’, this did not then directly follow on to an expression of OCEB.

Another study using Social Exchange Theory to investigate EPB performance examined workplace settings in Mexico (Paille & Mejia-Morelos, 2014). With similar findings to the previous study, this study found that ‘perceived organisational support’ indirectly affected EPB performance in the workplace via the job attitude of ‘employee commitment to the organization’, but that this relationship was not apparent for the job attitude of ‘job satisfaction’.

A recent Australian study investigating workplace EPBs examined how social norms can influence the expression of EPBs at work (Norton, Zacher & Ashkanasy, 2014). The study used the Theory of Normative Conduct, which suggests behaviour can be
explained by the social norms around the behaviour and social consequences arising from performing the behaviour (Cialdini, Reno & Kallgren, 1990, cited in Norton et al., 2014). This theory further differentiates between norms arising from behaviours that are merely observed (descriptive norms), and those which have approval attached to them (injunctive norms). For the purposes of the study, the authors defined the injunctive norm as an employee perceiving that the organisation they work for has a positive orientation toward protecting the environment, and the descriptive norm as a perception that co-workers perform EPBs at work. They found that the perceived presence of an organisational sustainability policy is positively related to employee green behaviour, and that this relationship is mediated by employees green work climate perceptions (work climate perceptions encompass many facets, including perception of organisational support for the environment and observations of co-workers). Interestingly, they found distinct effects for the two types of norms, in that the injunctive norms of organisational support for the environment was related to the performance of tasks assigned by the organization, and the descriptive norms of perceptions around co-workers EPBs was related to the performance of more proactive behaviours that were not prescribed by the organisation.

Thus, there may be factors specific to workplaces that impact on the performance of EPBs in that context.

### 1.3 Towards a model of EPB performance

The preceding literature review has outlined fifteen factors which have been found to influence the performance of EPBs across many countries. The separation of factors is an artificial division, however, because decision making is a complex process which uses a range of considerations (Aronson, 1990), and factors likely interact to produce behaviour (Stern, 2000). Thus, it is important to examine the effect of a variety of predictive factors on behaviour, rather than examining the effect of single factors in isolation (Cottrell & Graefe, 1997; Sivek & Hungerford, 1990; Stern, 2000). It may be possible to integrate a number of influencing factors into a model which can predict EPB performance.

Before a model can be created it is important to consider whether EPBs are a single construct, such that one model could predict their performance, or if EPBs are sufficiently differentiated to warrant the development of separate predictive models.
for each specific EPB. Section 1.3 explores this notion and then summarizes a number of papers that have integrated factors into predictive models.

1.3.1 Is there a single EPB construct?

There is a substantial amount of evidence that suggests that different EPBs are distinct from one another. Many studies have found either a lack of correlation between the performance of different EPBs, or have identified varying predictors for different EPBs. Varying predictors have been identified in examinations of very different EPBs, such as water conservation and limiting driving (Baldassare & Katz, 1992), but also for similar behaviours such as frequency of participation in a curbside recycling program, and the amount of contamination contained in the recyclables in the same program (Oskamp et al., 1998). These study findings are summarized in 1.4.
### Table 1.4

**Summary of study findings demonstrating differentiation of EPBs**

<table>
<thead>
<tr>
<th>Study</th>
<th>Findings indicating a differentiation of EPBs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baldassare &amp; Katz (1992)</td>
<td>Political orientation predicted water conservation at home, but not limiting driving, recycling, buying environmentally safe products or overall EPB performance.</td>
</tr>
<tr>
<td>Cottrell &amp; Graefe (1997)</td>
<td>Education could predict correct waste management from boats, but not a measure of general EPBs. A measure of general EPB performance did not correlate with the specific EPB of correct waste management from boats.</td>
</tr>
<tr>
<td>Ebreo &amp; Vining (2001)</td>
<td>Self-reported waste reduction behaviour (such as reusing) was not related to self-reported recycling behaviour.</td>
</tr>
<tr>
<td>Ewing (2001)</td>
<td>Different people were willing to drop off recyclables if a drop off system replaced a curbside pickup system, to those who were willing to pay a user fee for the amount of household garbage produced.</td>
</tr>
<tr>
<td>McKenzie-Mohr (2000b)</td>
<td>Barriers to EPB performance tend to be behaviour specific.</td>
</tr>
<tr>
<td>Oskamp et al. (1991)</td>
<td>Participation in a curbside recycling program was not predicted by energy conservation behaviour, energy conscious purchasing or by past recycling for cash.</td>
</tr>
<tr>
<td>Oskamp et al. (1998)</td>
<td>Different predictors were found for different components of recycling in a residential curbside program, being; frequency of participation, amount of recyclable material recycled, and contamination.</td>
</tr>
<tr>
<td>Ritchie et al. (1981)</td>
<td>Correlation coefficient yielded from analysis of in-home energy versus automobile gasoline consumption was only 0.23.</td>
</tr>
<tr>
<td>Stern et al. (1983)</td>
<td>Different patterns of predictors found for two separate types of energy saving behaviour, being energy efficiency through structural changes (predicted by home ownership) and energy curtailment through repeated actions (predicted by personal norms).</td>
</tr>
<tr>
<td>Stern et al. (1999)</td>
<td>Different categories of environmentalism were affected by different aspects of religious belief.</td>
</tr>
<tr>
<td>Tracy &amp; Oskamp (1983/84)</td>
<td>Behaviours within Recycling and Consumer/Environmental Protection categories were somewhat consistent, but Home Maintenance and Transportation categories were not internally consistent.</td>
</tr>
</tbody>
</table>

In addition to the findings summarized in Table 1.4, a number of researchers have concluded that there is no underlying EPB construct (Barr, 2007; Pickett et al., 1993; Oskamp, 1995b; Oskamp et al., 1991; Siegfried et al., 1982; Stern, 2000; Tracy & Oskamp, 1983/84).
Within the same EPB, there may even be differing drivers for the various choices available. It appears that the choice to select different travel-modes have different precursors. A UK study found that car use could be predicted by intention and habit but that public transport use involved a more complex decision making process that did not rely on habit (Donald, Cooper & Conchie, 2014). A study conducted in Norway combined TPB variables, car habit and resistance to change in examining travel-mode choice (Nordfjaern, Simsekoglu & Rundmo, 2014). This study found the largest predictor of travel-mode intention was subjective norms, but that choosing to use public-transport was a more planned and deliberate choice than choosing to use a car.

It has been suggested that contextual constraints cause a differentiation in the behavioural expression of EPBs that may otherwise group together (Black et al., 1985; Corraliza & Berenguer, 2000; Oskamp, 1995b). A study by Black et al. (1985), for example, found different patterns of predictors for energy curtailment behaviours (typically repetitive behaviours, such as turning down the temperature on the thermostat) and energy efficiency behaviours (typically one-off behaviours, such as insulating one’s home) but evidence suggested that this difference was a result of contextual constraints (eg. may not have been able to afford infrastructure changes, may not own home).

There is also some opposing evidence indicating that EPBs do form a single construct. Hamid and Cheng (1995) found that willingness to participate in a range of antipollution acts correlated with the specific act of signing an anti-pollution petition by Hong Kong students, as did a history of performing a range of EPBs. The authors attribute these findings to the existence of an overarching antipollution construct, and possibly to the existence of a broad overarching pro-environmental construct. In a questionnaire study with US teenagers, Vaske and Kobrin (2001) initially believed that their scale could be divided into four general behaviours (learning how to solve environmental issues, talking with others about environmental issues, trying to convince friends to act responsibly, and talking with parents about the environment) and three specific behaviours (joining community clean-up efforts, sorting recyclable rubbish and conserving water by turning off the tap while washing dishes), but found that the ‘…behavioral indicators reflected a single environmentally responsible latent construct’ (p. 2001). Thogersen (2004) conducted a questionnaire study with Danish consumers and found that, although low correlations for the performance of pairs of EPBs were obtained at the item level, a large and significant correlation was found.
once measurement error was corrected. He concluded that measurement problems may be a reason that low correlations are often found between EPBs.

Still other research has suggested that while there may not be a single EPB construct, particular EPBs may group together to form clusters. In a study investigating the behaviours of Norwegian consumers, Bratt (1999) did not find a general environmental behaviour, but did find that correlations between EPBs increase as they become more similar. Other studies have found a range of cluster sets. These are summarized in 1.5.
### Table 1.5

*Cluster sets identified in previous studies*

<table>
<thead>
<tr>
<th>Study</th>
<th>Clusters identified</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guagnano et al. (1995)</td>
<td>Residents who recycled particular items were more likely to recycle only certain other items in the following pattern of clusters; 1. Glass, aluminium and plastic (all recycled in the same bin) 2. Newspapers, magazines and clothing 3. Car batteries and motor oil</td>
</tr>
<tr>
<td>Stern (2000)</td>
<td>The following divisions have been found to be ‘statistically reliable and psychologically meaningful’ (p. 410): 1. Non-activist behaviours in the public sphere (may affect the environment only indirectly): a. Environmental citizenship, that is, taking a proactive approach to protecting the environment eg. signing a petition b. Support/acceptance of public policy 2. Private-sphere behaviours, which can be further divided (based on the fact that different decisions are involved in each one) into: a. Purchasing one-off major goods or services which may have an impact on the environment eg. a car b. Green consumerism (considering the environmental impact of production processes) c. Use and maintenance of environmentally significant goods eg. home heating systems d. Waste disposal 3. Environmental activism eg. taking part in demonstrations 4. Behaviour that influences the actions of organisations to which the actor belongs (eg. if the actor is an employee) 5. Other types of EPBs</td>
</tr>
<tr>
<td>Stern et al. (1999)</td>
<td>Found four types of support for social movements (with a focus on the environmental movement in particular) that are empirically distinct from each other: 1. Citizenship actions (eg. letter writing, donating money) 2. Policy support and acceptance (even when they involve some personal sacrifice) 3. Personal sphere behaviours that accord with movement principals (eg. consumer behaviours) 4. Activism</td>
</tr>
</tbody>
</table>
The clusters identified in Table 1.5 are of varying specificity. The broadest clusters distinguish between the largest categories of behaviour, for example, between private, public, organizational and activism EPBs (Stern, 2000). The next level comprises general categories within those broad categories, for example, reusing/recycling, conserving and replacing products with environmentally preferred options are clusters of EPBs performed under the umbrella of private sphere behaviours (Caltabiano & Caltabiano, 1995). The final level comprises clusters of specific behaviours performed within the general categories, for example, recycling particular types of products are clusters are performed under the umbrella of recycling (Guagnano et al., 1995). The breakdown proposed by Stern (2000) includes two levels of clusters which have been rigorously researched and are empirically supported.

Seemingly very different EPBs have at times also been found to correlate with one another, possibly indicating unexpected clusters. Guerin et al. (2001), for example, in a study conducted across the 15 countries of the European Union, found that people who participate in local programs to protect the environment were more likely to also recycle, and Schultz and Oskamp (1996) found that three types of conservation being energy, water and gasoline correlated highly.

In recent years, researchers have begun to examine the concept of ‘behavioural spillover’ in relation to EPBs (eg. Poortinga, Whitmarsh & Suffolk, 2013; Thogersen, 1999). ‘Behavioural spillover’ in this area is the idea that performing one type of EPB may result in a spillover to performing other EPBs. This lends support to the idea that different EPBs are connected. Some evidence for the presence of behavioural spillover in relation to EPBs has been found.

A recent Danish study assigned students who had volunteered to participate in a study on consumer behaviours to either a group that was offered financial compensation for buying eco-friendly products, a group who were praised for buying eco-friendly products, or a group who were not exposed to any intervention (control) (Lanzini & Thogersen, 2014). Eco-friendly consumer behaviour, as measured by a shopping diary, increased for those in the experimental conditions. A small amount of behavioural spillover did occur. It was into behaviours that were quite different to eco-consumerism, for example, recycling, and use of public transport. The authors note that spillover occurred mainly for low-cost behaviours. In another Danish study,
Thogersen (1999) found that separating household waste for recycling spilled over into environmentally friendly consumer choices for Danish adults. Again, these two behaviours are in quite different areas.

There may be a delayed spillover effect. A study that found introducing a charge for shopping bags in Wales resulted in an increase in people bringing their own bags when they shopped as well as an improvement in attitude toward this behaviour did not find a positive spillover to other EPBs, either for waste-related or non-waste-related behaviours. The authors note, however, that the increase in positive attitude toward this behaviour may result in positive spillover in the longer term (Poortinga, Whitmarsh & Suffolk, 2013).

Activist behaviours may form their own cluster, as empirically identified by Stern (2000; Stern et al., 1999) and Karp (1996). At least two other studies have also identified that activism has its own unique set of predictors. In a Canadian study, Seguin, Pelletier and Hunsley (1998) found that compared to non-activists, activists had higher perceptions of health risks from environmental conditions, were more intrinsically motivated to perform EPBs, and placed more importance on environmental problems. A Swiss study by Finger (1994) found environmental knowledge predicted activist behaviours, but not standard EPBs, and that those more likely to perform activist behaviours were less likely to favour technological solutions to environmental problems, to be more likely to be political environmentalists, to have more nature experience, higher environmental knowledge, higher environmental values and higher fear of environmental problems.

An additional consideration in determining whether or not there is a single EPB construct is the idea that individuals may perform compensatory behaviours subsequent to performing EPBs which negate the positive environmental impact of the original behaviour. Compensatory behaviours have been noted in relation to energy use within residential homes. Infrastructure changes, such as insulation, which produce a reduction in the price per unit of warmth, may result in higher energy use by householders, as expressed by people enjoying higher levels of warmth in their homes (Hsueh & Gerner, 1993). Verhallen and Van Raaij (1981) found that there was more airing out of rooms in insulated homes than in non-insulated homes, thus requiring increased heating which then negates the savings made on heating by the insulation. A longitudinal study examining oil use found that when people performed a behaviour to save oil, they subsequently used more oil.
when performing other oil-using behaviours (Pitts et al., 1981). Thogersen (1993), in a study with Danish adults, found that household recyclers were less likely to try to reduce packaging waste when shopping. He concluded that these two behaviours were related, in that those who recycled at home may have believed that because they were reducing waste in one arena they could afford to be wasteful in another and thus, that these behaviours were rooted in the same set of general, internalized values for any individual. This result was supported again in a more recent study by Thogersen (1999) in which a survey of Danish adults found that the performance of recycling behaviour reduced the feeling of obligation to reduce packaging waste. These findings lead Thogersen (1993) to conclude that although they may not appear to correlate with other ‘…environmentally friendly behaviours are not (italics in original) independent’ (p.72). Another study did not find compensatory behaviour being performed, in that increasing recycling did not correlate with an increase in the overall amount of waste produced, transportation use, purchasing behaviour or energy use (Bratt, 1999). This phenomenon has also been referred to as ‘negative spillover’.

Thus, although the findings of many studies indicate a differentiation of EPBs, there is some evidence that this may be caused by the influence of contextual variables, the phenomena of compensatory behaviour, or measurement problems. There is also some evidence which supports a single EPB construct, and some to support the existence of clusters of varying specificity. Thus, it is possible that there is an overarching EPB construct but that it is multi-faceted, that is, there exists some distinction between clusters of EPBs. Activist behaviours appear to be sufficiently distinct from other types EPBs as to be excluded from a potential single EPB construct.

1.3.2 Models to predict EPB performance

A small number of researchers have begun to integrate factors to form predictive models. Some of these models focus on particular behaviours, others attempt to predict broad EPB performance. Few are tested. The models outlined in this section are in addition to the ‘attitude’ and ‘value’ models described in Sections 1.2.7 and 1.2.8.
One recent model is that of Barr (2007) who divided hypothesized predictors into value-based factors, psychological factors (altruism, intrinsic motivation, subjective norms, environmental threat, response efficacy, self-efficacy, logistics and environmental citizenship) and contextual factors (behavioural context, socio-demographics, behavioural experience and knowledge), and adapted them into a model using elements of the Theory of Reasoned Action, as presented in Figure 1.6.

**Figure 1.6.** Barr’s (2007) hypothesized model of the prediction of waste-management behaviour.

![Figure 1.6.](image)

*Figure 1.6. Value-based factors, as well as contextual and psychological factors are hypothesized to contribute to behavioural intention. This intention, as well as direct effects of contextual and psychological factors are hypothesized to contribute to one EPB, being waste management behaviour. Adapted from “Factors influencing environmental attitudes and behaviors,” by S. Barr, 2007, *Environment and Behavior, 39*(4), p. 444.*

Barr (2007) used the model to examine three waste management behaviours (reducing, reusing and recycling) with questionnaires to English householders. The research yielded separate results for each behaviour, and no one model could be developed.
Lindsay and Strathman (1997) created a theoretical model of predictors of recycling behaviour based on the Health Belief Model, borrowed from the field of health psychology. After adding a number of factors to the model and testing it via telephone surveys to Missouri residents, they concluded that their modified version of the model provided a solid basis for the future development of a more rigorous model. The model states that performing curbside recycling can be predicted by:

- Perceived likelihood of environmental degradation occurring,
- Costs of preventative action,
- Self-efficacy,
- Consideration of future consequences.

Another model was developed by Hines et al. (1987) based on the results of a meta-analysis of studies that examined determinants of EPBs, presented in Figure 1.7. This model was not tested. It suggests that psychological factors can lead to intention, and that a subsequent interaction between intention and situational (contextual) factors produces the EPB.
Figure 1.7. Hines et al.’s (1987) proposed model of responsible environmental behaviour.

Figure 1.7. A range of personal factors are believed to influence an individual’s intention to act. Intention and situational (contextual) factors are then proposed to interact to produce an EPB. Adapted from “Analysis and synthesis of research on responsible environmental behavior: A meta-analysis,” by J.M. Hines, H.R. Hungerford, & A.N. Tomera, 1987, Journal of Environmental Education, 18(2), p. 1-8.

Hungerford and Volk (1990) proposed a model that suggests that an individual will perform an EPB if they first experience awareness of environmental issues, then feel ownership over the issues, and finally feel empowered to take action. It is proposed that these steps occur in a linear fashion, and that each variable includes major and minor components. The model is presented in Table 1.6 below. This model has not been scientifically tested.
Table 1.6

**Hungerford and Volk’s (1990) model of EPB performance**

<table>
<thead>
<tr>
<th>Entry level variables</th>
<th>Ownership variables</th>
<th>Empowerment variables</th>
<th>Citizenship behaviour</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minor variables</td>
<td>Knowledge of ecology. Androgyny. Attitudes toward pollution, technology and economics.</td>
<td>Knowledge of consequences of behaviour, both positive and negative. A personal commitment to issue resolution.</td>
<td>In-depth knowledge about the issues.</td>
</tr>
</tbody>
</table>

Although not assimilated into a model, and not empirically tested, Stern (2000) has created a comprehensive list of causal variables that may influence EPB performance, as follows:

**Attitudinal**
- General environmentalist predisposition (as per VBN)
- Behaviour specific norms and beliefs
- Non-environmental attitudes (eg. about product attributes)
- Perceived costs and benefits of action

**Personal capabilities**
- Literacy
- Social status
- Financial resources
- Behaviour specific knowledge and skills
Contextual factors

Material costs and rewards
Laws and regulations
Available technology
Social norms and expectations
Supportive policies
Advertising

Habit and routine

There are increasing numbers of attempts to integrate a range of factors into models to predict the performance of EPBs.

One model that has been used to investigate EPB performance is the Model of Goal-Directed Behaviour (MGB) (see Figure 1.8). The MGB is a behaviour prediction model that extends the TPB (Ajzen, 1991) by adding ‘past behaviour’ and ‘anticipated emotions’, and also by making a distinction between ‘desire’ and ‘intention’ (Perugini & Bagozzi, 2001, 2004, cited in Carrus, Passafaro & Bonnes, 2008). ‘Desire’ has been defined as ‘…a state of mind whereby an agent has a personal motivation to perform an action or to achieve a goal. Such motivation is based on an integration of different sources of appraisals (eg. emotional, evaluative, social) and represents the first step towards a decision to act, typically followed by an intention to do so’ (Perugini & Bagozzi, 2004, p. 71, cited in Carrus, Passafaro & Bonnes, 2008, p. 53).
Figure 1.8. To create the MGB, supplementary factors are added to the TPB (Ajzen, 1991) to create a more comprehensive model of behaviour prediction. Adapted from “Emotions, habits and rational choices in ecological behaviours”, by G. Carrus, P. Passafaro & M. Bonnes, 2008, *Journal of Environmental Psychology*, 28, pp. 51-62.

Carrus, Passafaro and Bonnes (2008) used the MGB to examine intentions regarding travel-mode choice and household recycling. Their findings indicate that the MGB is able to predict intentions to engage in the EPBs examined. Frequency of past behaviour emerged as the best predictor of both desire and intention, and desire emerged as a strong predictor of intentions. The effect of perceived control on desire was not strong. The authors believe that perceived control may have differing effects depending on the behaviour being examined. Also using the MGB, Passafaro et al. (2014) examined travel-mode choice in Italy. Their results indicated that positive emotions mediated the effect of attitudes, perceived social norms and negative emotions on desire, suggesting that emotions are an important factor in environmental behavioural choices. The inclusion of anticipated emotion variables in...
this model is notable as emotions are not usually included in psychological models of EPB prediction.

An original, and complicated, model of factors thought to predict EPB performance was created by Bamberg and Moser (2007) via conducting a Meta-Analytic SEM of the psycho-social determinants of EPB expression contained in the NAM (Schwartz & Howard, 1981) and the TPB (Ajzen, 1991), as depicted in Figure 1.9. The authors were guided by Hines et al.’s (1987) meta-analysis, and they identified 57 samples to analyze from the literature. The construct names they utilized are not identical to those used in the original theories. In the model, ‘moral norms’ (or ‘personal norms’) and ‘social norms’ are differentiated (they are not in the original NAM, which also includes values with them as constructs that need to be activated in order for altruistic behaviour to be performed). ‘Problem awareness’ has been added in as a ‘probable’ cognitive precursor based on Hine’s et al’s (1987) meta-analytic model. Whilst the authors did not explicitly define ‘internal attribution’, it appears to be equivalent to the construct of ‘AC’ (Schwartz, 1977). The construct ‘feelings of guilt’ has been added in as another probable precursor to moral norms.
Figure 1.9 Bamberg and Moser's (2007) meta-analytic SEM of EPB performance.

Figure 1.9. This diagram depicts the model that emerged from the MASEM conducted by Bamberg and Moser (2007) from 57 samples of studies using the NAM (Schwartz & Howard, 1981) and TBP (Ajzen, 1991) to examine EPB performance. Adapted from “Twenty years after Hines, Hungerford, and Tomera: A new meta-analysis of psycho-social determinants of pro-environmental behaviour,” by S. Bamberg & G. Moser, 2007, *Journal of Environmental Psychology*, 27, pp.14-25.

The model created supports the findings of previous research that intention mediates between the predictors examined and behaviour. The authors note that this model can better predict behavioural intention than behavioural expression. The authors also note that factors not contained in the two theories included in their meta-analysis may also play a role in influencing behavioural choice, for example habit.

The most important findings from this study are that perceived behavioral control, attitudes and moral norms are all independent predictors of behavioural intention, that moral norms are determined by feelings of guilt, social norms, internal attribution and problem awareness, there are associations between many of the factors, for example, between social norms and PBC and attitudes and between feelings of guilt and attitudes, and that internal attribution predicts many of the other factors in the model. The results indicate that both self-interest and pro-social (moral) factors
contribute to the expression of EPBs. The authors note the importance of including moral variables in psychological theories examining EPBs, and that moral norms appear to arise from an interplay between cognitive, emotional and social factors. This study highlights the complexity surrounding the determinants of EPB expression.

Other researchers have discussed the integration of factors without forming a diagrammatic model. Verplanken, Walker, Davis and Jurasek (2008) demonstrated that various drivers of EPB performance work together. The researchers intersected the ‘self-activation hypothesis’ which states that in order for values to influence behavioural choices that the relevant values need to be part of an individual’s self-concept and that the values need to be cognitively activated (Verplanken & Holland, 2002, cited in Verplanken, Walker, Davis & Jurasek, 2008) with their ‘habit discontinuity hypothesis’, an idea based on previous research which suggests that habits are more likely to change when the context around the habitual behaviour changes. The authors hypothesized that a change in context may activate individuals to focus on and use information relevant to a behaviour, in particular, values, which could trigger a change in behaviour from a previously habitual behaviour. The study consisted of a survey to employees from a small UK university with good public transport access about their travel-mode choices to work, their recency of moving house (context change) and their environmental concern using the revised NEP. The results revealed that those who had recently moved and were also high on environmental concern used their cars less often than others for commuting to work. This held true for comparison with those low on environmental concern, but also to those high on environmental concern who had not moved recently. The authors assert that these results indicate that the context change was important in activating sustainability values, which encouraged a change in habit to a more environmentally friendly choice.

An integrated conceptualization of engagement with environmental issues, including behaviour, was developed by Lorenzoni, Nicholson-Cole and Whitmarsh (2007). In an article examining engagement with climate change by UK citizens, the authors describe a state of connection to the issue as comprising cognitive, affective and behavioural components, that is, for effective engagement to be realized, people need to know about climate change, care about it and also be doing something about it. Their conceptualization differs from other theories in that it posits that the three elements co-exist, rather than having a linear progression. It also specifies that
these components arise from individual elements as well as contextual sources of social and institutional influences.

Gifford and Nilsson (2014) conducted an extensive review of the literature pertaining to personal and social factors that relate to EPBs and environmental concern. They identified 18 factors, being childhood experiences, knowledge and education, personality and self-construal, sense of control, values and political/world views, goals, felt responsibility, cognitive biases, place attachment, age, gender, chosen activities, religion, urban/rural differences, norms, social class, proximity to problematic environmental sites and cultural or ethnic variations. Their review suggests that those who perform EPBs and to be concerned about the environment are ‘...likely to have spent time in nature as a child, to have accurate knowledge of the environment, its problems and potential solutions, to have an open, agreeable and conscientious personality, to consider the future consequences of their actions, to feel in control of their behaviours, to harbour biospheric, post-material, liberal values and responsibility for environmental problems, to be among the upper half of the economic classes, to hold personal and descriptive norms about pro-environmental action, to adhere to a religion that teaches a stewardship orientation to the earth, and to spend time in non-consumptive nature activities’ (p.11). The review also concludes that there are contextual variables that contribute to environmental behavioural decisions, although they are not listed. The authors conclude that these factors combine in complex ways and that research to investigate the relationships between the variables is required.

In a review article, Steg and Vlek (2009) note that much research into the antecedents of EPB performance can fall into one of three categories; perceived costs and benefits, moral and normative concerns, and affect. They argue that these theoretical approaches do not include the important consideration of contextual variables. They also assume that individuals will make reasoned choices and neglect the influence of habit. They thus argue for the inclusion of contextual variables and habit as important considerations in the study of the drivers for EPB performance, and promote the case for the creation of comprehensive models of drivers of EPBs.

One model that does attempt to integrate specified contextual factors is the Comprehensive Action Determination Model (CADM) (Klockner & Blobaum, 2010), as represented in Figure 1.10 below. Klockner and Blobaum (2010) combined
elements from the TPB (Ajzen, 1991), the NAM (Schwartz & Howard, 1981), added other variables, such as habit, and notably, also added the ‘ipsative theory’ of behaviour (Tanner, 1999, cited in Klockner & Blobaum, 2010) which incorporates contextual variables, to create a very comprehensive theory for the performance of EPBs. The authors argue that the performance of EPBs is a result of a complex interaction of factors, and that none of the theoretical frameworks that have been used to examine the precursors to its expression have considered the full complement of potential factors.

**Figure 1.10** The Comprehensive Action Determination Model (CADM) (Klockner & Blobaum, 2010).

![Diagram of the Comprehensive Action Determination Model (CADM)](image)

**Figure 1.10.** The Comprehensive Action Determination Model (CADM) incorporates numerous variables, including contextual variables, in a comprehensive model of EPB prediction. Adapted from “A comprehensive action determination model: Toward a broader understanding of ecological behaviour using the example of travel mode choice,” by C.A. Klockner & A. Blobaum, 2010, *Journal of Environmental Psychology, 30*(4), pp. 574-586.
Testing the CADM with travel-mode choice behaviours, the authors found that it could explain more variance in travel-mode choice than the less comprehensive models tested (TPB, NAM and a combination of both). Notably, the situational influences were responsible for most of the variation in travel mode choice, and the influences of intentions and habits were also significant. Social and personal norms were mediated by habits and intentions. The relationship between intention and behaviour was moderated by habit. The utility of this model is further supported by the results of a meta-analysis that examined the elements of the model in relation to a range of EPBs which found the model supported by the data (Klockner, 2013).

The growing number of attempts to create a theoretical model of EPB performance or to integrate an comprehensive list of factors together to better understand the interplay of drivers for EPB performance indicate an increasing desire by environmental psychology researchers to identify the range of variables that need to be considered to capture the complexity of predicting EPBs, and an acknowledgement of the important role of identifying the contextual variables that may play a role. Differentiated contextual variables, however, are only identified in one tested model outlined here.

1.4 Limitations of the literature, overall thesis rationale and aims of the current study.

The literature clearly indicates that there is a range of factors that can influence the performance of EPBs. It has been empirically demonstrated that the 16 factors described in Section 1.2 can influence the occurrence of EPBs.

Psychology is not the only discipline that is attempting to assist in the solution of environmental problems by considering influences on the behaviours that contribute to the problems. Using sociological frameworks Shove (2010), for example, has used Social Practices Theory to argue that dominant social systems (e.g. the political outlook, the consumer culture) exert such influence on environmental behavioural choices as to make individual choice negligible. The current research recognizes that behaviour is expressed based more than simply on the processes that occur within the minds of individuals. Therefore the current research attempts to extend the traditional psychological focus on the psyche as the determinant of behaviour and to integrate as many potential influences as possible, whilst still including the
relative influence of the internal psyche.

These 16 factors have been studied by numerous researchers who have usually examined a small selection of them. With the exception of an initial gathering by Stern (2000), bringing together a comprehensive list of the various factors that have been examined in relation to EPB performance has not previously been undertaken. It is important, however, to examine multiple factors together (Hines et al., 1987) in order to gain an understanding of the relative strengths of each factor, to produce an awareness of possibly overlooked factors and to examine the way that factors work together to produce behaviour.

The consolidation of a comprehensive range of factors into a theoretically sound model has also not previously been undertaken. There are theoretical models that examine in detail the psychological processes that precede EPB performance, notably the TRA and TPB (as described in Section 1.2.7), and Schwartz’s (1994) Value Theory and the VBN (as described in Section 1.2.8). Their authors acknowledge the powerful role of contextual constraints on final behavioural choices (eg. Stern et al., 1999). These models classify contextual factors together as a single construct, and do not discriminate their relative impact on EPB performance. One exception is the inclusion of one stand-alone contextual factor in the TRA and TPB, that of social norms. The discipline of psychology is broadly concerned with the drivers of human behaviour, including all determinants of these drivers, and not only the internal psychological processes that precede behaviour. Indeed, Stern (1992), a leading thinker in the field of environmental psychology, has asserted that an important role of environmental psychology is to investigate how psychological constructs interact with contextual factors to produce ERBs, and Weigel (1985) asserts that incorporating the relevant contextual as well as psychological factors into a theoretical model would provide a more powerful predictor of EPB performance. An empirically supported model that includes identified psychological as well as contextual factors has not yet been developed.

Currently, this area lacks a solid theoretical foundation (Schultz & Zelezney, 1998). Stern (1992) has noted that one way psychological researchers can contribute to the field of environmental behaviour research is to yield and refine relevant theory, and to do so in such as way as to make the findings relevant to non-academic practitioners. Creating a new model to predict EPB performance by consolidating
and testing the factors that appear to play a role would also involve the development of new theory regarding EPB prediction.

The current research aims to address these omissions by creating such a theory, incorporating a model that includes a comprehensive collection of motivating factors for EPBs, including both psychological and contextual factors.

A single model for all EPBs, rather than tailored models for each separate EPB, appears possible. This is suggested by the conceptualization of an overarching EPB construct as discussed in Section 1.3.1. Further, many of the factors outlined in the literature review are able to predict a range of EPBs. Social norms, for example, have been found to predict quite different EPBs when they are specific to the behaviour, such that having friends and neighbours who recycle can influence recycling behaviour (Oskamp et al., 1991) and witnessing others practicing water saving techniques can lead to water saving behaviour (Aronson, 1990). This phenomenon further lends support to the notion that a single model may be able to predict the performance of a range of EPBs. Such a model, however, may require varying emphasis on factors when predicting different clusters of EPBs.

In addition, very little research in this field has been conducted in Australia. The bulk of studies have been conducted in the USA, with a small number from Canada, South America, Europe and isolated studies from other countries. Particular Australian patterns that may differ from those in other countries is therefore unknown.

Within the broad goal of investigating precursors to EPB performance, therefore, the current research aims to:

- Contribute new, accessible theory to the field of conservation psychology by developing a theoretical model of motivating factors which can predict the performance of a range of EPBs,
- Test and refine this model,
- Examine EPB performance within Australia.

These aims will be addressed via three studies. The first will gather previously undocumented knowledge held by practitioners in the field of fostering sustainable behaviour. The results from the first study will be combined with the literature to create a theoretical model of factors which may motivate the performance of EPBs.
A second study will then develop a valid and reliable survey tool to evaluate the model. This survey tool will be used in a third study to empirically test the model, which will then be further developed based on the Study 3 results.
Chapter 2

Study 1 - Interviews with experts in the field of fostering EPBs

2.1 Introduction and rationale

The broad aim of investigating the precursors to the performance of EPBs is addressed in Study 1 by examining the knowledge held by environmental educators, that is, people who work to encourage the performance of these behaviours.

This source of information has been neglected by previous studies which have instead sampled the populations in which the behaviours are being scrutinized (see Chapter 1 for a comprehensive literature review). It is possible that the professionals who consider these issues daily represent a substantial untapped source of information regarding this research question, and may possess knowledge that previous studies have not captured. This information could complement that which exists in the literature.

Conversely, educators are often unaware of research findings which could assist their work. A leading environmental psychologist based in Canada who specializes in the field of behaviour change, McKenzie-Mohr (2000a, 2000b; McKenzie-Mohr et al., 1995; McKenzie-Mohr & Smith, 1999) believes that ‘…psychologists need to participate with program planners in an ongoing dialogue to ensure that their research efforts are both informed and informative’ (McKenzie-Mohr, 2000a, p. 536). The current study may contribute to creating such a dialogue. This may indirectly facilitate the tailoring of information for professionals by researchers.
2.2 Aim

The aim of Study 1 was to catalogue knowledge held by experts in the field of environmental education about the motivators and inhibitors of EPB performance.

There are no hypotheses for Study 1, as it is an exploratory study.

2.3 Methodology

2.3.1 General research approach

A qualitative research approach was utilized in Study 1. In this way, the current research differs from the quantitative approach of the majority of psychological studies (Smith, 2003) which use a deductive approach and typically seek to test pre-conceived theories (Belgrave, Zablotsky & Guadagno, 2002). In contrast, qualitative approaches are inductive and exploratory (Belgrave et al., 2002). A qualitative approach was selected for this research given the limited scientific knowledge about EPBs at the time that this study was conducted, as well as the exploratory nature of the study. It was used to discover novel real-world ideas and to assist in the development of new theory.

There is a large range of approaches in qualitative research (Punch, 2005), but they can broadly be defined into two groups. The first, a phenomenological approach, seeks to interpret the meanings that experiences have for individuals (Ashworth, 2003). The second group uses a ‘grounded theory’ approach, which seeks to develop new theory based on the research data (Strauss & Corbin, 1998; Glaser & Strauss, 1967). The grounded theory approach generates robust theory which can be tested due to the fact that it is based firmly in data, rather than on intuitive assumptions or creative imaginings (Glaser & Strauss, 1967). A grounded theory approach was used for Study 1 in line with the aim of developing a taxonomy of factors to be used as a theoretical framework to examine predictors of EPBs.

Qualitative research methods have previously been used in environmental psychology studies. Wandersman, Hallman and Berman (1989), for example, used a qualitative approach to examine the psychological effects of living near a hazardous landfill. The authors believe that qualitative approaches are appropriate for
examining environmental issues as they can provide real-world, relevant findings and also facilitate the development of new insights.

The approach used in Study 1 was not purely qualitative, however, in that the nature of the answers sought was one more typically found when using a quantitative approach; that is, list-type answers were solicited (a list of the factors which participants believed could predict the performance of EPBs), as opposed to a focus on personal experiences. Data analysis also used quantitative elements, such as counting the number of participants who mentioned particular factors. Using elements of both approaches to produce a mixed methodology such as this can be useful in order to maximize the strengths of each approach (Punch, 2005).

There is a number of emerging theoretical perspectives that promote the usefulness of combining non-academic expertise with scientific knowledge. This synthesis can contribute to more thorough, relevant and applicable research.

‘Mode 2 knowledge production’ (Gibbons et al., 1994, cited in Hessels & van Lente, 2008) is one emerging scientific approach that aims for more relevant knowledge production than traditional, or ‘mode 1’ scientific approaches. It does this by extending research out of a solely academic arena and involving the context of application, by being transdisciplinary, by using heterogeneous data sources including non-academic expertise, by researchers being aware of the social consequences of their research and by seeking economic, political or social reviews in addition to peer reviews for quality control. Studies have begun to examine ways in which ‘mode 1’ and ‘mode 2’ science can be used together to increase the relevance of sustainability studies (eg. Genaidy, 2010; Mitev & Venters, 2009).

Related theoretical approaches that have similarly been explored as ways to improve the relevance of sustainability behaviour research include ‘lay expertise’ which involves integrating the expertise of relevant lay-people with the academic expertise (eg. Albe, 2012; Delgado, 2008; Moran, 2011) and ‘participatory decision-making’, an approach promoting the participation of a range of stakeholders in addition to leaders to solve problems, and which can be used to solve environmental problems (eg. Celino & Concilio, 2011). A final approach discussed here is ‘post-normal science’ (Funtowicz & Ravetz, 1993) which considers problems arising at the science-policy-society interface such as uncertainty (as opposed to traditional natural science notions of the scientific certainty of results) and the role of values in research. It
considers that part of the solutions to these problems involves including a plurality of perspectives and to involve the peer community. A ‘post-normal’ approach has been applied to the study of environmental issues (eg. Petersen, Cath, Hage, Kunsler & van der Sluijs, 2011; Upham, Riesch, Tomei & Thornley, 2011; Wesselink & Hoppe, 2011).

These emerging theoretical approaches lend support to the rationale for the current study to combine the knowledge of practitioners with that of the academic literature.

Individual interviews were chosen as the optimum method for data collection as participants could provide intuitive responses without being constrained by pre-conceived answer options, as per the intention of discovering novel ideas. It also allowed for relevant deviations from the original questions, which provided information to assist in the development of new insights and theory.

2.3.2 Participants

Nineteen participants took part in Study 1, comprising 11 men and eight women. They worked in a variety of fields - nine worked with a focus on the general community, four with employees of corporations, four with municipal councils and one with university students. A focus of the work of all participants involved promoting environmentally preferred behaviours and attitudes. One participant worked in a voluntary position, two worked in both professional and voluntary positions, and the remainder worked in professional positions. Participants had between one and 30 years of experience in this field.

Whilst there are many people involved in facilitating behaviour change for sustainability (for example, parents, city planners), environment educators were selected for study as the focus of the current research was an examination of the drivers for expression of EPBs by individuals.

Expert status was determined by the researcher. As this was a nascent and very small professional area at the time of data collection (2002-2003), anyone identified whose job focused on promoting change in people’s behaviour for the purposes of protecting the environment and who had worked in the field for at least one year, was included. These people are pioneers in carrying out this type of work and thus hold
substantial knowledge about it. There was no formal job title or training for these kinds of jobs.

2.3.3 Method

Study 1 comprised semi-structured interviews with experts in the field of environmental behaviour change.

Targeted sampling of professionals working in the field of environmental behaviour change was used to select participants, using both network sampling (potential participants being identified through their professional position, as known to the researcher) and snowball sampling (potential participants being recommended by a existing participant). Representatives from a broad range of organisations were approached in an attempt to capture a comprehensive range of relevant expertise. This pragmatic method was deemed to be suitable as the field of environmental education is so small, and the type of participant sought was very specific.

Requirements for inclusion were that the main focus of the participant’s position was to encourage an increase in the performance of environmentally preferred behaviour, that they had been working in this field for at least one year, and that they currently worked in the city of Melbourne.

Twenty-one individuals were contacted by the researcher via telephone at their workplaces, or approached face-to-face at industry functions. The project was explained to them orally. For those who agreed to participate, a time was arranged to meet in order to conduct the interview. Two people who were approached declined to participate, one due to previous commitments, and the other as he thought he was not the ideal person for the study. This individual, however, recommended an alternative participant from his workplace who subsequently participated in the study.

Two participants were sent an Explanatory Statement (see Appendix A) and Consent Form (see Appendix B) in the mail before the date of the interview, and the remainder preferred to receive them on the day. Two participants requested to see the interview questions (see Fig. 2.1) before the date of the interview, and these were e-mailed to them. The remaining participants preferred not to see the questions before the interview itself.
One participant preferred to provide written answers to the interview questions rather than to be interviewed face-to-face, and her data were collected via e-mail. Seventeen semi-structured interviews were conducted face-to-face between August 2002 and December 2003. Interviews were conducted either in the participant’s workplace, or in a cafe near their workplaces. Two individuals from one workplace were interviewed together and were treated as a single participant in analysis, resulting in a final count of 18 participants. All remaining interviews were conducted with a single participant.

Rapport was established via polite conversation before the interview itself. It was then ensured that the interviewee had read the Explanatory Statement if it had been sent to them previously, or it was provided to them at this point and time was allowed for them to read it. Participants then either provided their signed Consent Form if it had been sent to them previously, or signed one at the time. All those who had agreed verbally to participate signed the consent form and proceeded with the interview.

Semi-structured interviews were then conducted with participants. Questions appear in Figure 2.1 below. The questions contained in the interview arose from the broad research question, which aimed to discover what was known by experts regarding fostering sustainable behaviour. Questions were usually asked in the order they appear in Figure 2.1, but depending on answers given, the subject matter was discussed in a different order. In all interviews, every planned question was asked. Generally, the interviewer asked questions and participants provided answers in a straightforward manner. The interviewer would occasionally explain questions again, if asked. When participants appeared to have completed answers for each question, the interviewer would frequently ask ‘Can you think of anything else?’ to ensure that all options had been exhausted.
Figure 2.1 List of interview questions for Study 1.

1. Could you tell me a little about the work you do now, and the work you have done in the past, toward environmental education (any aspects of this education)?

2. What do you believe are some of the reasons that people perform environmentally responsible behaviour in Australia today?

3. What do you believe are some of the possible barriers to people performing environmentally responsible behaviour in Australia today?

4. What strategies have you used that you have found to be effective in increasing the performance of environmentally responsible behaviour?

5. What strategies have you used that you have found to be ineffective in increasing the performance of environmentally responsible behaviour?

6. What do you believe are the most important aspects of environmental education in Australia today, and why?

7. What do you believe needs to be done now to improve environmental education / what is missing?

Figure 2.1. Seven questions were planned for interviews in Study 1, and these were asked in order unless the conversation flowed naturally towards an exploration of information in a varied order.

There were some minimal changes to the way questions were asked over the course of the study. One aspect of grounded theory methodology involves evolving interview questions over the course of a study in order to tailor them more effectively. As a qualitative study progresses, and the researcher starts to conceptualise the emergent data, new issues which the researcher realises may be important, or changes to the way data are collected in order to more effectively fulfill the aims of a study, may occur to the researcher (Charmaz, 2003). Changes made in the current research were a reduced focus on the interviewees’ personal history (as per question 1) in order to increase concentration and time available for discussion around the influential factors regarding EPBs, and elimination of questions 6 and 7 regarding the educational process, as these were not providing information relevant to the research aims.
Interviews were audio-taped and written notes were taken during the interview. In many of the interviews, food or drink was consumed by both the interviewer and the interviewee before or during the interview. Interviews ranged in time from 20 minutes to 1.5 hours. This time range was due to the different length and depth of answers provided.

Interviews were transcribed verbatim. The taping of one interview (R18) did not record successfully so written notes taken during this interview were used for analysis. These seventeen records of the face-to-face interviews, and the one written response, comprised the raw data for analysis.

No further participants were sought after the eighteen interviews were complete for two reasons. First, the qualitative methodological concept of ‘saturation’ states that when ideas start repeating, and no, or very little, new information is being gleaned, there is no need to gather further data (Charmaz, 2003; Guest, Bunce & Johnson, 2006). Further, Guest et al. (2006) have mathematically calculated that, assuming some structure in data collection and some homogeneity of participants, that 12 participants are usually sufficient to achieve saturation. The researcher was forming codes and noting trends as the research progressed as per qualitative methodology (Punch, 2005), and thus an awareness existed that saturation had been reached after the eighteen interviews.

Secondly, participants were frequently providing the names of people who had already been interviewed when asked for referrals for additional participants, indicating that at least a large proportion of people in the field had been accounted for, and therefore as much of the relevant expertise as possible had been captured.

Before data analysis commenced, the typed transcripts or notes of interviews were e-mailed to participants for approval. This was a Monash University Ethics Board requirement, and allowed participants to ensure that the data accurately reflected their thoughts. Thirteen interviews were approved without changes, three participants could not be contacted as they had moved workplaces without leaving forwarding details, and two participants did not respond to e-mails or follow up phone calls.
2.3.4 Data analysis

Thematic analysis of the data was conducted. This type of analysis involves noting themes that emerge from the data and sorting the data into thematic categories (Markovic, 2006; Ryan & Bernard, 2003). This process is commonly called ‘coding’ the data. The QSR NVivo computer program (Version 2.0.161) was used to conduct thematic coding utilizing the interview transcripts as well as the written notes taken during interviews, and the one written response.

The validity of qualitative analysis can be increased by more than one researcher coding the data and comparing ideas about themes (Kurasaki, 2000; Ryan & Bernard, 2003). This method was used in the current study, with two researchers coding and discussing the data. A number of steps were taken, as follows. The primary researcher, who also conducted the interviews, began initial coding during the research process, that is, after each interview, as per a qualitative approach (Punch, 2005). When all interviews were complete, the two coders together discussed the aims of the study and some of the initial ideas of the primary coder, and then separately identified the parts of the raw data which addressed the research aims. These made up the final data set. These data were then sorted into categories and each category given a label, or ‘code’.

Data for the first 10 transcripts (R01-R10) were coded separately by the two researchers. A high level of agreement was reached, and slight differences discussed until complete agreement was achieved. Due to the initial high level of agreement the second researcher read over coded interview texts for the remaining transcripts (R11-R18) for checking, rather than independently coding them. Full consensus was reached on the codes.

One disagreement, however, was not resolved by the two coders. The primary coder believed that one theme – that of the interviewees personal experiences of feeling connected to nature – should be included in the results, whereas the secondary coder believed that this theme was irrelevant to the research aim of discovering the drivers for the performance of EPBs by laypeople. This theme has been included in the results section with a disclaimer about the link between this theme and EPB performance.
The very high initial level of agreement between the two coders was facilitated by the fact that the majority of the analysis consisted of classic coding, where answers consisted of specific lists which fell easily into categories, rather than analysing free-flowing text where data often consist of personal experiences which are more vague (Kurasaki, 2000). For example, see text below from R17:

*Interviewer – ‘What do you believe are some of the reasons that people perform environmentally responsible behaviours, generally?’*

*R17 – ‘There are lots of reasons. Research shows that, and I tend to agree, that people are motivated by things like doing the right thing, like a sense of citizenship, people are motivated by care for their children, or future generations, nieces, nephews, etcetera, people are also motivated by financial benefits, through water saving etcetera, they’re also motivated by comfort benefits, and then there’s sort of some, a whole that is greater than the sum of its parts, which is the kind of the feel-good factor, if you like, or all of these things feel good, and it aligns with their ethical sensibilities and direction and reinforces that, is an outcome of it and reinforces it, but also, there’s things like peer group pressure and status’.*

Each item on the list in the above quote fit neatly into a separate code.

Finally, codes were grouped into broader categories, which form the sub-headings in the results section.

### 2.4 Results

Analysis of the data revealed a large range of factors that participants believed were precursors to EPB performance. The first and most obvious themes to emerge consisted of a list of the predictors of EPBs, and a number of other interesting themes relating to EPB performance emerged throughout data analysis.

An important distinction was made between factors which *encourage or inhibit* EPB performance and those that *allow or prevent* the expression of EPBs. Both the positive and negative impact of factors on EPB performance are included here. Other major themes that emerged from the data were the importance of factors appearing together and the fact that no single constellation of factors can predict
EPB performance in all people. In addition, the untested nature of participants’ ideas was noted by the participants themselves.

2.4 Factors which encourage or inhibit EPB performance

2.4.1 Social norms

Participants felt that social norms were the most important factor in determining whether or not individuals would perform EPBs. It was cited as a factor by seventeen out of eighteen participants (R01 – R17), and three participants (R09, R10, R15) reported using a ‘learning through peers’ educational strategy, demonstrating their belief in the power of social norms as an influential factor. Two participants (R03, R04) explicitly expressed their belief that this factor was the most important reason that people performed EPBs and one participant (R06) said it was the only real barrier to the performance of EPBs. Further, three participants (R03, R04, R06) believed social norms to be such a compelling predictor of EPBs that they each said that individuals would find a way to overcome almost all other barriers to particular behaviours if the social norm was strong enough.

‘The physical [barriers] just tumble if you’ve got the social’ (R03).

Four facets of the influence of social norms on the general public’s EPB performance emerged from the data: i) an internally motivated desire to ‘fit in’ to the wider social context, ii) a feeling of pressure exerted by others, iii) a desire to avoid the ‘greenie’ stereotype, and iv) the power of visibility.

i) Desire to ‘fit in’
This facet of social norms implies that people perform EPBs because they are internally motivated by a desire to fit into the larger social context in which they operate. Nine participants cited this as a reason for performing EPBs (R04, R05, R06, R07, R09, R11, R14, R15, R16).

‘...if you’re surrounded by signs that tell you what to do, but also, somehow, you can perceive the place where you are to be of that sort of inclination, so, not recycling would be the wrong thing to do, and be perceived as the wrong thing to do as well, that’s a big factor into why you would recycle...It’s required. It’s the norm, just like in
a pub where you're surrounded by Tigers fans, you're not going to shout ‘Go Crows!’
You’d probably shout ‘Go Tigers’, even if you’re not a Tigers fan’ (R04).

Two participants noted that social pressure to perform EPBs exists for businesses as well as for individuals, whether it be one CEO influencing another (R09), or businesses wanting to keep up with the current trend to report on their annual Triple Bottom Line performance (R07). Triple Bottom Line reporting involves making information available regarding the social and environmental performance of a business over the past year, in addition to information regarding its financial performance.

ii) Pressure from others
This category implies that people perform EPBs because they are motivated by a feeling of external social pressure. Fourteen participants (R01, R02, R03, R04, R05, R06, R07, R08, R09, R12, R13, R15, R16, R17) cited this as an important driver for EPB performance. For instance, when asked about the reasons people perform EPBs, R13 provided a list of reasons, including ‘…peer group pressure, people don’t like to be seen to do something wrong’, and R15 included in her answer to the same question ‘peer group pressure, being part of the norm’.

This external pressure can come from other individuals, sometimes known as ‘peer pressure’ (R03, R04, R05, R06). R03 explained that he believed that at times this occurred through some EPBs attracting social derision (for example, picking up rubbish in a public place), thus disaffirming the actor and discouraging the behaviour. This inhibition can also arise from the wider social context (R02, R12, R17). R12 said ‘…[environmental behaviour is] still…the alternative, its not the mainstream’.

Four participants noted that social pressure can play a role in the performance of EPBs within families. Three ways in which this can happen were identified by participants: one’s family history can determine the level of EPBs performed (R11), adults may perform EPBs in order to set a good example to, or even to impress, their children (R08), or children can exert social pressure on their parents to influence them to perform EPBs (R07, R08, R11, R12).

‘…its really important to educate a lot of the young people in schools, ‘cos you can really have a lot of influence with that, I think… a lot of kids have influence at home, you know, with their parents. They can get things happening at home…’ (R11).
Again, this type of social pressure was cited by one participant (R02) as existing for businesses as well as individuals.

iii) To avoid the 'greenie' stereotype
Five participants cited a desire by people to distance themselves from the stereotype of 'greenie' as a barrier to performing EPBs (R02, R06, R10, R11, R12). For instance, R10 commented;

[A barrier to EPB performance is] I think just the stereotype that if you think about the environment then you’re a tree-hugging greenie. If you start to worry about these [environmental] things, you’ve got to stop washing and grow dreadlocks and buy clothes from op-shops’ (R10).

R02 suggested that entrenched attitudes may be against ‘greenie’ ideas because of the perception that it involves sacrifice.

iv) Visibility
The social pressure exerted by the simple fact that some EPBs are particularly visible to others was cited as an influential factor on EPB performance by three participants. Seeing others performing a behaviour such as curbside recycling (R07, R09, R14) or bringing reusable shopping bags to the supermarket (R14) may influence others to do the same.

Conversely, behaviours that are not immediately visible, such as reducing energy use may be more difficult to change (R14).

R07 believed that visibility may allow for a public demonstration of one's own behaviour, and R17 and R09 believed that visible EPBs may even elevate social status for some.

‘…in some circles, very small, unfortunately, it will be considered high status to be living in a very energy efficient, water efficient, recycling all your water etcetera, etcetera, you know, doing all those sorts of sustainable living things, recycling, and all that, it can be a status symbol, you know, to have a Toyota Prius, for example’ (R17).
Again, this was thought to be true for corporations as well as individuals (R09).

‘…That same influence extends to organizations. So, an organisation like (name of large organization) has had a big influence on its peers’ (R09).

2.4.1.2 Incentives

Receiving an incentive was mentioned by many participants as an influential precursor to EPB performance. Five sub-factors emerged in this category: i) financial incentives, ii) business marketing, iii) behavioural reinforcement, iv) other incentives, and v) financial disincentives.

i) Financial incentives

Ten participants mentioned finance as a factor which they believed encouraged EPB performance (R01, R07, R08, R09, R10, R11, R12, R14, R17, R18), with R18 stating that he believed that this was an influential factor for a large proportion of people.

Two sub-categories emerged from the participants’ thoughts on financial incentives. The first is saving money (R07, R08, R09, R10, R12, R14, R17), such as the financial savings which result when less energy is used (R12, R17), or receiving a discount when buying environmentally preferred goods (R14).

‘Maybe a more important and more immediate driver might be financial reasons. So they look at it and simply say, ‘It’s cheaper. If I don’t waste things, I save money’ (R07).

The second is that EPBs can help to increase profit (R11, R14), such as when land resale value increases due to good land management (R11).

A number of participants mentioned using financial incentives as a strategy to increase the performance of EPBs. Rebates for environmentally preferred infrastructure, such as for solar hot water systems, was thought to be effective in encouraging their purchase (R09), as were give-aways which could be used to entice people to begin performing certain EPBs, such as a subsidy to purchase products to be retrofitted into homes (R17). R17 and R18 believed that emphasising financial gains was a useful strategy for increasing the performance of EPBs. R08 was
considering introducing financial incentives to increase energy conservation behaviour by staff within his corporate workplace:

‘We have central business units…they pay for all the energy consumption, and then they pass on that cost to individual business units based on how much space they occupy in the building. We’re looking at programs where, for those business units or buildings that are performing well…there might be cost reductions in what that property business unit will actually charge them. So, there’s a financial incentive in that the good performers pay less per unit of resources they use, and on the flip-side, there might be a penalty…applied to those that aren’t performing so well’ (R08).

Importantly, R01 and R17 noted that financial incentives are more effective when provided in conjunction with information.

Two participants thought that financial incentives for EPBs may be an especially salient factor for businesses (R10, R13).

ii) Business marketing
One particular type of incentive mentioned by numerous participants was the positive business marketing achieved by being more environmentally friendly. Interestingly, those who worked within corporate settings (R04, R05, R08) did not mention business marketing as a driver for EPB performance, but a number of participants who worked as partners to businesses perceived that business saw EPBs as good PR (R07, R10, R11, R12, R14).

‘…[for] companies and businesses, its good PR. They’re not necessarily doing it for the environment. Its more for the publicity and that type of thing’ (R11).

R07 thought that businesses wanted to be perceived as socially responsible in response to increasing interest from consumers, R10 believed that corporate organisations want to be seen to be leading the way and that environmental behaviours were now at the fore, and R12 thought that there was increasing pressure on businesses to be environmentally friendly.
iii) Behavioural reinforcement

Behavioural reinforcement was mentioned by participants as an influence which could either encourage or inhibit EPB performance.

Two participants believed that positive feedback could encourage EPB performance. This may be in the form of a ‘pat on the back’ or a reward for performing EPBs (R14), or via receiving a non-environmental positive outcome, such as the benefits of compost to one’s garden (R09).

Negative reinforcement can also act as a barrier to EPB performance, for example, having a bad experience such as a jam in a photocopier caused by recycled paper (R12, R14).

Or, there could be positive reinforcement for negative behaviours:

[People might think] “I saw lots of people throwing cigarette butts down, and they never got fined, so therefore there’s nothing wrong with that, I can do that too” (R14).

EPBs are often not reinforced, posing a barrier to their performance (R07, R17). R07 thought that the fact that not seeing an immediate effect of one’s actions, for example, not seeing the whole recycling process when placing a bottle in a bin, was a particular absence of reinforcement.

iv) Other incentives

A range of other incentives for EPB performance were mentioned by participants, including awards or rewards (R13, R14, R15), the ‘feel-good’ factor (R13, R17), a sense of achievement (R11), having fun (for example, when exploring nature) (R07), receiving a spiritual experience (R07) or protecting personal space, for example, campaigning against the building of a chemical waste plant near one’s home (R12, R13).

As a strategy to increase EPB performance within a corporate setting, R08 has used incentives such as business unit level awards, as well as prizes and public recognition via gifts and days off.

Giving away free gifts was also seen as a good strategy (R11, R17):
‘There’s also, sort of, scaled down versions of the financial incentives, so you might actually give people, like a AAA rated shower rose, or compact fluorescent globes, like a kit of, ‘This is what you do, and how you do it’ (R17).

One participant (R06), however, found this strategy ineffective. She had advertised free calico bags in a major newspaper, but it had not been effective in attracting people to an environmental stall in a busy public space.

R10, who worked for a municipal council, noted that the absence of a direct personal benefit when performing an EPB could be a barrier to its performance:

‘…in restaurants, when it came to the lighting retrofits, because they [restaurant owners] didn’t necessarily see lighting as something that was going to bring in the customers, they didn’t [do it]’ (R10).

v) Financial disincentive
Fourteen participants mentioned costs of EPBs as a disincentive which prevent their performance (R01, R05, R06, R07, R08, R09, R10, R11, R12, R14, R15, R16, R17, R18). Costs may be perceived (R05, R18), or actual (R07, R09, R11), for example, wind power is more expensive than coal (R09).

One cost cited by a number of participants was the initial payment for infrastructure to enable an EPB (R05, R10, R11, R17):

‘…financial investment, being able to afford to put in $5,000 worth of insulation, people can be told about the pay-back, or they can even be told about the net present value, but there’s always a barrier, you know, people are cash short’ (R17).

Two participants noted that short term costs act as a disincentive, even when long term savings are apparent (R08, R16). This is true for householders, such as for installing a water tank or a solar hot water system (R16), as well as for businesses (R08):

‘Other barriers is, typically organised large corporates, or any business, will look at their return on a particular investment. So, if you say, ‘Well, we’re going to implement a bit of equipment, or a system that’s going to save us on our energy consumption, but its going to take 2, 3, 4 years to pay back that bit of equipment on
how much we save on our power bill, a lot of companies will have a fairly short period
that they look at their rate of return, so they’ll say, ‘We’ll only, you know, you’re
asking us to pay $200,000 to put in a bit of equipment to save energy, but we’re only
going to get our $200,000 back in 5 years time, that’s too far out. We’ll only consider
something that pays us back in a year’. (R08).

R10 noted that initial financial costs may actually never be paid back.

Financial disincentives can also be positive for the environment, when they act to
prevent an individual from performing an environmentally damaging behaviour.
These types of disincentives include enforcement and fines for damaging behaviours
(R17, R16), levies (R01, R06), and that the less environmentally preferred option
may be more expensive, for example, it is more expensive to waste products (R07).
R06 felt strongly about the power of, and energy attached to money when it is used
as a disincentive in the form of a levy:

‘…what would be effective, if the government did it, would be a levy [on plastic
bags]… money really has so much energy attached to it, that money works…Now, if
people want a plastic bag, pay for it…and then that money can then be used to
perhaps offset the detrimental effects of that plastic bag…You can persuade, you
can ask, you can encourage, and it just gets ridiculous in the end, you’ve just got to,
it shows some leadership, and it shows that you’re fair dinkum if you start to put a
dollar value on things’ (R06).

2.4.1.3 Values

Participants cited a range of values, and caring values in particular, as reasons
people perform EPBs. Four sub-categories which encouraged the performance of
EPBs emerged from the data on values: i) caring about the environment, ii) caring
about future generations, iii) wanting to do the right thing and iv) matching behaviour
to values. An additional sub-category, v) having value priorities which differed from
those which focused on the environment, emerged as a barrier to the performance of
EPBs.
i) Care about the environment

Caring about the environment was seen as an important factor in predicting the performance of EPBs by ten participants (R02, R05, R06, R07, R08, R11, R12, R15, R16, R18). Responses included simple caring about the environment (R06, R07, R08, R11), feeling passionate about the environment (R11, R12), understanding and being concerned about the impact of behaviour on the environment (R06, R18), valuing natural beauty (R05), having a ‘deep ecology’ world view (R12), actively believing in protecting the environment (R15), possessing a feeling of moral responsibility toward the environment (R16), and personal interest (R08). R02 took a broad view as seen in the following quote:

‘…from a training point of view, you’ve got two choices. One is to decide you want certain behaviours and to train people to produce those behaviours, like, if you want people to recycle, then you set up a program that gets people to recycle, whereas if you want people to change…beliefs so that they think the environment is important, [this] probably has a far bigger benefit…long term. If you get people to recycle, they’ll recycle, but they may not turn off their computer because its using energy, or they may not close the door because there’s a draft coming in and wasting all the heat. Whereas if they’d start to change their personal attitudes [note; although R02 used the word ‘attitude’, here, the concept he was discussing falls into the definition of ‘values’, rather than ‘attitudes’ for the purposes of the current thesis] then there’s a lot of things that you don’t have to train them to do, they’ll spontaneously do those’ (R02).

A number of participants mentioned that they believed that people care about the environment because they have made a connection between the state of the natural environment and the survival of humankind (R03, R07, R12) and of the larger biosphere (R07, R11).

‘I think that a lot of people do care about the environment. They see things happening, and they have a genuine concern about animals becoming extinct, ecosystems being disrupted…that’s a fairly important…driver for this environmentally responsible behaviour’ (R07).
ii) Care about future generations
Six participants cited care for future generations as a driver for performing EPBs (R07, R10, R11, R12, R16, R17).

‘But if you look at, say, businesses, they’re motivated in a different sense and one of the things that some businesses that I’m aware of, there are probably a couple of reasons that they take on responsible behaviour, environmental behaviour, one would be, there’s a genuine interest by some people, and its probably more of a belief than a behaviour, but, in future, I mean it’s a longer term, saying, ‘My children are going to inherit what I’ve got’. So, it’s that kind of, I’m not sure what you’d even call it, maybe it’s a guilt thing, maybe it’s a, ‘I should care about it because I’m giving this to my children’ (R07).

Three participants had noticed this to be particularly influential for those with grandchildren (R10, R11, R12).

‘Often people with kids, I mean, they’re too busy making a living, they don’t even spend the time with their kids, its more their grandkids that they get affected by. So, there’s that really interesting generational, sort of, interaction that happens, I reckon, because people, sort of, start to think beyond them…you know, they’re preparing for their death or retirement, so they’re thinking, ‘Well, what good can I do now?’; and they want to give back to society’ (R12).’

The concern described may be for one’s own children or grandchildren, or it might encompass others such as nieces and nephews, or generally for generations to come (R17).

R17 noted that this concern may stem from the desire to be a good parent, which is not a specifically environmental value.

iii) Want to ‘do the right thing’
Six participants believed that people may perform EPBs because they have a sense that it’s the ‘right thing to do’ (R02, R09, R10, R11, R12, R17).

‘I just remember one scenario where the people were pretty disinterested, you know, they were going ‘Oh, you know, if we’re going to have recycling that’s cool’, but they weren’t particularly environmentally aware, or interested in environmental stuff, but
after a while of being told ‘You have to put the recycle paper in there, and single sided paper has to go by the printer’, these people would do it, and they’d been told ‘You’ve got to do it’, and they’d do it, and then one day when the bin wasn’t there, they’re going ‘Well, hang on, where’s the bin?, because they wanted to do the right thing. Like, it wasn’t about being particularly aware of environmental stuff, but they wanted…to do what they were supposed to do’ (R02).

R12 noted that wanting to do the right thing may be an automatic response from some:

‘…some people, I think they just do it because it’s the right thing to do, so they maybe don’t think about it too hard, but they like to do the right thing’ (R12).

The value of ‘fairness’ was mentioned by one participant (R16) as a driver for EPB performance.

‘It’s kind of a contribution thing, that if my broad community is short of water, its unfair of me not to help, you know, pitch in, with everybody else. I think it’s a fairness issue. And I’m not saying everybody feels this, but I think there is a lot of this, that it is unfair for me to waste a whole lot of water when my next door neighbour is doing everything they can to save water’ (R16).

iv) Matching values and behaviour

R09 and R17 both said that when people’s behaviour aligns with their ethical sensibilities that it feels good, which then reinforces the behaviour.

v) Values as a barrier

Values can inhibit EPB performance when a higher priority is assigned to values that differ from, or directly conflict with, environmental values.

Seven participants noted that the environment is often regarded as a lower priority than a range of competing needs and desires (R07, R08, R12, R11, R13, R17, R18). One participant provided a list of common competing value priorities as being consumerism, status, comfort and image (R17) and another provided the example of a larger vehicle being safer than a smaller one which uses less fuel, with safety gaining higher priority than environmental impact (R07). One participant cited the Maslow Hierarchy of Needs, saying that environment fits in after survival (R12).
A reluctance to sacrifice elements of lifestyle was cited by four participants as a barrier to EPB performance (R02, R10, R12, R13), for example, wishing to maintain an English-style garden despite it requiring heavy watering (R10). Other values that may inhibit EPB performance include taking the environment for granted (particularly for city dwellers) (R12), apathy (R01), not perceiving the environment to be important (R04), believing ‘its not my job’ (R04), or a belief that environmentalism prevents societal progress (R12).

Two participants noted that a clash of values can be a barrier for businesses as well as individuals (R08, R10). R08 had the following to say about dominant business practice -

‘Your individual level of an employee who is assessed, you know, their bonus, where they get it, or their performance review in 6 months, or a CEO of a company. You know, the average life of a CEO isn’t very long, relatively speaking, maybe 2 or 3 years. Particularly public companies, they’ve got an obligation to shareholders to have a financial return to their shareholders. So it’s a very short term focus, rather than a long term focus, which sometimes can be a big barrier to making [environmental] improvement’ (R08).

2.4.1.4 Connection with nature

Feeling connected to nature was cited as a driver for performing EPBs. This may be feeling a part of a larger sphere (R06), or feeling spiritually connected to nature (R07). Possible reasons for this feeling of connection may be because one has an emotional attachment to the land (R06) or because nature can provide a spiritual experience (R07, R12).

R07 used this factor in strategies to increase EPBs:

‘Just giving the facts, telling you that the rainforests are being depleted, won’t change your behaviour in most cases. If I can get you to empathise and feel for that environment, that’ll help more’ (R07).

Conversely, participants believed that lacking a feeling of connection with the earth can inhibit EPB performance (R01, R12).
‘…being in touch with our environment is just not something that our type of society is strong on….When [people are] asked ‘Where does water come from?’ they really picture a tap. They don’t actually picture a water cycle and a whole eco-system that ends up providing that in a sustainable way…being out of touch with nature is a huge barrier’ (R01).

Experiencing the environment was seen as an important part of feeling a connection to it (R01, R07, R09, R12, R17). This could be in the form of school camps which ‘encourag[e] people to actually appreciate natural beauty and get some of that closeness to nature and closeness to the environment’ (R01), environmental education centres (R01), or through Outdoor Education in schools (R12):

‘I think…nature has its own energy…we’re not attuned to it anymore…So…giving people the opportunity to get in touch, you know, through…going out and experiencing it’ (R12).

More than half of all participants spontaneously mentioned a feeling of a connection with nature as a central, emotional and powerful element of their own personal experience (R01, R02, R04, R05, R06, R07, R09, R12, R14, R17). This was a striking result because spontaneous sharing of personal experience, as opposed to a focus on others’ experiences, occurred for this factor only.

‘Why do I care? I’m getting some tears here. It’s really deep in me to, I just feel a connection to the earth and, I can’t answer it. Too emotional.’ (R06).

‘…I remember the best time [as a child] was going to the park and playing, looking for tadpoles, and running around in the gardens, so for me, it was such a contrast, not having a backyard, that when I went [to the park] I just went, ‘Wow, this is where I want to be’…. And our house backed right onto the beach, so as a kid, we’d go there on the weekends, and in summer we’d be able to just go and run out in the back and play in the water and get down in the sand. And I used to, just sort of loved that, you know, that sensation of just lying there and feeling part of it. I think also….having studied science, having a real wonder and curiosity of how things worked in nature, it just intrigued me and I think my passion comes from the fact that I just love nature, love the environment so much, and it hurts me. I cry when I see what’s going on and I see how people don’t care’ (R12).
‘Going out into the ocean, surfing…it’s the most beautiful experience when you’re sitting out there. You just feel at one with the earth, or, you know, with water, with the ocean’ (R12).

The second coder believed that participants’ personal experience was not a relevant result, as the aim of the study was to investigate drivers and inhibitors of environmental behaviour and participants did not explicitly link their environmentally-connected emotions with their own EPB performance. The first coder, however, felt that these emotionally charged experiences were relevant as all participants could automatically be classified as environmental activists due to their working in this field, an EPB. Their participation in their jobs can be classified as an activist EPB as at the time of data collection this was not a recognized career field, and these pioneers were creating it based on their passion.

2.4.1.5 Convenience

Three facets of convenience were mentioned by participants as factors which encourage or inhibit EPB performance: i) ease, ii) comfort and iii) time, and increasing the convenience of EPBs was a popular strategy employed by participants to foster the performance of these behaviours. Another sub-category that emerged from the data relating to convenience was iv) its irrelevance as a motivating factor.

i) Ease
The most commonly mentioned facet of convenience was the ease of performing the behaviours, cited by seven participants (R07, R10, R11, R12, R14, R15, R16).

‘…a lot of environmentally friendly behaviours require more effort. I think people in their busy lives just want to do the quickest and easiest thing a lot of the time. So riding a bike…or walking instead of driving is effort and time’ (R16).

A few participants mentioned curbside recycling as a particularly easy behaviour and attributed its widespread adoption to this (R01, R07, R10, R11).

[Curbside recycling is] very easy to do it, and I think that’s a pretty crucial sort of thing. And I think its probably one thing that they can be successful at. People don’t like to do things that they’re going to fail at, and they don’t want a challenge…Some
of the other behaviours, things like...using less energy, or less water, are not as easy, because it's not as easy to quantify those things’ (R07).

Nine participants thought that when EPBs were perceived as inconvenient or too hard, that this was a barrier to their performance (R04, R05, R07, R08, R10, R11, R12, R14, R16). This may occur when people put a behaviour into their ‘too-hard’ basket (R04, R05, R07, R08, R11, R12, R14), when they were simply being lazy (R04, R11, R12), when they thought ‘it’s not my job’ (R04), when the behaviour required extra thought (R10), or when it seemed like too much change (R12). R10 said the following:

[One barrier to EPB performance is] Just remembering to, say, take calico bags to the supermarket instead of using plastic bags, like out of convenience, just having to put that bit of extra thought into what they're doing' (R10).

Many participants noted that they believed that using convenience was an effective strategy to increase the performance of EPBs, that is, making behaviours easy to perform (R07, R10), showing people that changing won’t adversely impact on their lifestyle (R10), or making the action simple and instructions obvious (R12, R16).

ii) Comfort
One participant mentioned receiving comfort benefits as a driver for EPB performance (R17).

iii) Time
Four participants mentioned the fact that EPBs may take more time to perform than the less environmentally preferred alternative (R07, R12, R16, R18) as an inhibitor of performing these behaviours.

iv) Irrelevance of ‘convenience’
Three participants believed that if other conditions were favourable, inconvenience would cease to be a barrier. R06 believed that many inconveniences around EPBs can be resolved with little effort, R04 believed that using inconvenience as a barrier is a ‘cop out’, and R03 believed that if social pressure is strong enough people will find a way to overcome physical barriers.
2.4.1.6 Infrastructure and services

Participants referred both to physical infrastructure (eg. having bins in which to place recyclables) as well as services to facilitate EPBs (eg. access to a recycling service).

While the presence or absence of infrastructure or services can allow or prevent some EPBs (see Section 2.4.2.1), levels of the availability or effectiveness of infrastructure and services can also encourage or inhibit EPB performance.

The presence of effective infrastructure was mentioned by three participants as a predictor/inhibitor of EPBs (R01, R09, R14):

‘…one of the big influences on behaviour change for household and business recycling is to have a decent system where they can fairly easily separate out their materials and they’ll be picked up and taken away.’ (R01).

The structure of existing systems often conveys a less environmentally preferred option, such as the presence of inefficient infrastructure in existing homes (R17), or building inefficient infrastructure into new houses (R09) which may encourage less environmentally preferred behaviour such as wasting water (R12):

‘…the way things are set up, they’re not set up with environment as a first priority… you have to do the alternative, like…on a toilet, you can’t push the half-flush button, you’ve got to lift it, in some cases. Now, that’s not normal. Normally you push’ (R12).

R02 noted that simply installing infrastructure to facilitate EPBs can have a more dramatic effect on behaviour than other strategies:

‘If you want people to change behaviours and do a specific thing, you’re better off setting up infrastructure around that thing to make it happen rather than trying to get people to change their personal viewpoint. Like, if you’re setting up a recycling program, to get everyone to go ‘Well, recycling is really cool and I’m going to get right into it’, its far harder than putting a recycling bin next to everybody’s desk and telling them off when they don’t put the rubbish in the recycling’ (R02).
Three participants mentioned that the mere presence of a convenient service (such as curbside collection of recyclables) results in people using it (R12, R15, R16).

‘…they might do something because it’s a technocratic approach, you know, because it’s a system there, they’ve got an ability to use that system and its easy for them to do it’ (R12).

Three participants provided small amounts of infrastructure as part of educational strategies: providing a jotter holder to staff members to store paper used on one side, to be used for scrap paper (R10), providing a tool kit containing some infrastructure such as an AAA rated shower rose and compact fluorescent globes (R17), and handing out calico bags to be used as an alternative to plastic (R06).

R10, who worked for a municipal council, listed some of the infrastructure implemented at her workplace which transformed environmentally preferred behaviour into the default. These included internal office-based infrastructure such as installing flow restrictors on taps, having dual-flush toilets, using LPG fleet cars and paying for offsets for fleet car emissions, as well as public domain infrastructure including re-using water at reserve sites, collecting rainwater to flush public toilets, and planting drought-tolerant flora in the municipality.

Infrastructure can also pose a barrier, for example, when the environmentally preferred infrastructure is less effective, for example, in the past recycled paper would often jam photocopiers (R12).

2.4.1.7 Knowledge

Many participants mentioned knowledge as an important factor in determining the performance of EPBs. This included an understanding of the link between behaviour and detrimental environmental impact as well as procedural knowledge about how to perform particular behaviours.

i) Understanding of the link between behaviour and detrimental environmental impact

Many participants cited the understanding of the environmental impact of particular behaviours as a driver for performing EPBs. Responses included an understanding of consequences of behaviour on the environment coupled with caring about those consequences (R06, R08, R11, R16, R18), understanding and respecting the value
of resources (R12), realizing that environmental issues are personally relevant (R18), or simply being aware of the issues (R09).

‘There are the reasons of, ‘I’m aware of an issue, I’m concerned so I’m going to do something about it’, so…the high awareness of water shortages, so, ‘I know this is a problem and therefore feel I have to contribute and do something about it so we can all save water’ (R16).

One participant noted that knowledge can lead to both higher levels of commitment and increased empowerment to make environmental behaviour change (R02).

A few participants said that knowledge was more effective in encouraging EPBs when it was coupled with other factors such as incentives (R01, R17), infrastructure (R01, R14), regulation (R14) or other skills, such as problem solving abilities (R01).

Knowledge can also be a barrier to EPB performance. A lack of understanding that particular behaviours have problematic environmental impacts (R02, R07, R10, R11, R12, R14, R15, R16, R17, R18), or confusion and scepticism about issues due to conflicting information, for example, on climate change (R16) were cited as barriers to the performance of EPBs.

Possessing incorrect knowledge in the form of environmental myths was cited as a barrier to EPB performance. This included the myth that recyclables go to landfill after collection (R04, R08, R13, R14, R15, R16), that modern recycled paper voids equipment warranties (R15), that recycling has a worse environmental impact through water use than using virgin products (R14), or being fooled into believing that environmental problems are not serious (R06). In addition, the myths may lead to a general mistrust of systems, such as the recycling system (R04, R08), or of the people who are distributing the information (R14).

A specific type of missing knowledge which was seen as a barrier to the performance of EPBs was that regarding the ‘true cost’ of everyday behaviours (R07, R08, R09, R12), that is, the true environmental cost is not built into the price of products. The price of a soft drink, for example, does not include the cost of recycling the bottle (R09). Therefore, many people don’t appreciate the ‘true cost’ of everyday items (R12). The implication of this phenomena is that the market is communicating that
individuals are not required to pay for the consequences of their own environmentally damaging behaviours (R08, R09).

‘I think a big problem, also, is determining the true cost of things. You know, people pay for the electricity that they use, but that’s not the true cost. That’s the cost of actually, to make it and for the distributor to get it to your home, but the true cost is that by doing that, the greenhouse gas emissions, the impact on the environment, how much money is then poured into research into fixing these problems…a simple example is you go to a supermarket and if they charged you a dollar a plastic bag, because that might be the true cost to actually get rid of that bag, or a council to clean out the rivers when it’s stuck to a tree, or whatnot, then people might start to think, ‘Well, hey, you know, that’s how much it really costs, well I don’t want to pay a dollar, I’ll bring my own bag in’ (R08).

Five participants reported providing knowledge via education in order to encourage EPB performance (R01, R07, R08, R14).

One participant felt that educators had difficulty conveying knowledge effectively (R15):

‘[a barrier is] being able to communicate [knowledge about the impacts of behaviour] in tangible & simple ways’ (R15).

Three participants (R05, R11, R17), expressed reservations about the power of knowledge in changing behaviour:

‘I really question whether the ‘why’ is actually necessary. For some people it is. For some people, if they were to say to me, ‘…you should enter this competition’, and I’d say, ‘Why should I enter this competition?’, ‘Because you could win such and such and it won’t cost you anything’. Okay, that’s different, that might be why, and that might motivate me to enter the competition. But if someone was to say to me, ‘…you should recycle’, ‘Why?, ‘Oh, well, because, you know, it will improve the environment’, woopie doo! And you know, I think when it comes to the environment I don’t think people have this sense of needing to know why and all the ins and outs to motivate them to change (R05).
ii) Procedural knowledge
Possessing the procedural knowledge about how to perform particular EPBs was cited as a driver of EPB performance by five participants (R02, R04, R05, R11, R17). R05 believed that the knowledge of ‘how’ was significantly more important than the knowledge ‘why’.

Lacking knowledge about how to perform particular EPBs was mentioned by four participants as a barrier to their performance (R02, R04, R05, R06).

‘I think is just that lack of knowledge or lack of awareness and, you know, of what to do and where to go for help. So, its lack of knowledge of the ‘how to’” (R05).

Specifically, R02 mentioned that individuals often feel that they do not have the expertise to perform some EPBs, R05 thought that people might not know how to obtain procedural information and R04 thought that people might not even know that the option to perform a particular behaviour exists.

Instructing individuals on how to perform particular EPBs was believed to be a powerful driver by two participants (R04, R17). R04 mentioned that clarity of instruction was a vital driver for EPBs and R17 believed that individuals would be encouraged to perform particular EPBs after an assessment of their home which included showing them how to implement specific EPBs.

2.4.1.8 Empowerment

Seven participants believed that possessing a feeling of empowerment about the environmental impact of one’s behaviour was an important precursor to EPB performance (R01, R02, R11, R12, R13, R14, R17).

‘A lot of it is about empowerment, about, um, if you just tell them about the issues and say, ‘This is what’s wrong’, then they get depressed, like, um, a really common process in environmental workshops is for people to reach a point of despair, and just go ‘Well, this is all hopeless, we can’t do anything’. And part of the aim is to get to that point and then to take them out of it, or to, um, start helping them to see that there are ways that, if you look at the whole world and go ‘Well, the world’s pretty stuffed’, people go, ‘Well I can’t do anything about that, its too big, its too big a problem’, but if you get them to start to realise things like this whole problem has
come about through a whole lot of individual actions, then you can start to deal with
some of it through individual actions as well, and they go ‘Oh, okay’, and so its
finding pathways for them to do small things as they start to see the point’ (R02).

R14 felt optimistic about an increase in a feeling of empowerment in the community:

‘I think we’re starting to cross the barrier of the local to global, that the only
environmental changes that occur are at the local level, and that’s the only thing
we’ve got control over, so we all do our little bit, and it does make a difference, and
it’s the only way that change has ever occurred. But if you’ve got this perception
that, ‘I don’t make a difference’, then of course you’re going to throw things out your
window and you’re going to consume like there’s no tomorrow and you’re going to
drive down the freeway in, you know, one of three cars that you own, you know the
story. So, the sense that making a difference is an important one, and I think that,
and from a broad social context I think has shifted over time. Its one of those norms,
that’s moved across’ (R14).

An absence of empowerment was cited as a barrier to EPB performance by eight
participants (R01, R02, R04, R07, R08, R10, R14, R18). In particular, these
participants believed that many people felt that their individual actions would be too
small to make a meaningful difference to environmental problems:

‘It’s an attitude, that, “Well, surely if I stick my piece my piece of paper in the normal
bin or the recycling bin, its not going to change the world”‘ (R08).

R14 said that he thought that this belief was becoming more widespread, and one
participant believed that many people share a feeling of hopelessness, believing that
the world has gone to ruin already (R07).

Two participants cited the fact that people do not understand their own behavioural
power as a barrier to EPB performance (R08, R10):

‘…a lot of people…don’t have good enough understanding of what they can actually
achieve by making small changes’ (R10).
2.4.1.9 Regulation

Regulation was cited by eight participants as a reason people performed EPBs (R01, R07, R09, R12, R14, R15, R16, R17).

‘…local council can have by-laws on littering and all that sort of stuff. So, in terms of factors that do influence behaviour change, definitely regulation and legislation and enforcement can be an important part of the picture’ (R01).

Regulation could be in the form of a fine for wrongdoings such as littering (R15, R16, R17) or could be simply instructing people on what they are expected to do (R12).

R14 noted that regulation was a particularly important driver of EPB performance for those who might be opposed to making environmental changes.

Two participants mentioned that legislation can act as a barrier to EPB performance (R05, R07). R05 mentioned that the Australian Government has declined introducing a standard for a maximum blend of ethanol in fuels, preventing the development of potentially more environmentally-friendly petrol, and R07 mentioned possible health issues interfering with environmental ones, such as being required to give individually wrapped chocolates to program participants, rather than unwrapped, if this was part of the program.

2.4.1.10 Leadership

Leadership was cited as an important driver for EPB performance, via both i) formal leadership and ii) role models.

i) Formal leadership

Formal leadership was seen as an important driver for EPB performance by seven participants (R04, R05, R06, R09, R11, R12, R13).

It was seen as important within business …

‘...change [within an organization] doesn’t happen without leadership…and environment is probably a really good example where leadership is the lifeblood of the whole thing… you know, its unpleasant to say, but the vast majority of people
would really appreciate it if you didn’t ask them to think, and in that sense, leadership is almost easy when it comes to it, because all you have to do is, you have to do other things, but one thing you have to do is to just to tell people what to do, because that’s what they want’ (R04).

…within schools…

‘I used to collect the compost in the classroom, we had a compost at that stage, so our grade, or my grade, became responsible for collecting the compost around the school. A lot of this stuff really depends on a keen, knowledgeable and interested teacher, you know, people say, ‘Oh the kids are doing this and the kids are doing that’, and I always think, ‘Yeah, but behind those kids is a really keen teacher’. They can’t do it without a keen teacher, it just isn’t going to happen’ (R06).

…and from government:

‘Also the rebates for things like solar hot water and solar electricity I think are good, so, government is giving, you know, a very clear message that those things are good to do’ (R09).

Participants also noted that a lack of leadership can be a barrier to EPB performance (R05, R06, R11). For instance, R05 noted a lack of government support to business:

‘Think about solar. The Federal Government is actually thinking about rolling back rebates that they offer for photovoltaic cells on houses. Now that’s not necessarily legislation but it’s an issue where government aren’t being facilitators to provide the right mechanisms’ (R05).

Formal leadership can also be a barrier to EPB performance by blocking its expression (R05, R11).

‘…if you work somewhere and the manager or whatever keeps saying, ‘No, no’, that sort of thing, and stopping people from being pro-active, or, in a family, you know, if the parents aren’t prepared to do it, then its hard for the children to do it, or even just at schools as well, I suppose, is another place. If the Principle’s not willing to try and
be a little bit green, or do things at the school, then that’ll stop it, sort of, stemming down to the kids’ (R11).

A final mechanism by which formal leadership can act as a barrier to EPB performance is via individuals relying on leaders such as managers or councils to implement environmental initiatives, believing that EPBs are ‘not my job’ (R04).

ii) Role models
Role models were seen as an important form of leadership by four participants (R04, R05, R06, R15), both in inspiring EPB performance, or in inhibiting it if they are absent.

‘Leading by example is a form of indirect education that I strongly believe in, and that is missing to a large extent, from leaders, managers…and it goes with managers who print massive documents and everybody knows that its for no good reason’ (R04).

Two participants felt that corporations and local government play an important role in leading communities, but that environmental leadership is lacking (R10, R11).

‘…it would be good to see more, you know, organisations, corporations, leading the way and setting an example, and that doesn’t really happen in Australia, for a lot of things, so its sort of like, why should I do it if you’re not doing it? That, and that’s what I, sometimes I think in terms of local government as well, you really have to be leading the way’ (R11).

R09 believed that businesses can act as role models for other businesses:

‘…we’re partly trying to get leaders, like [name of a large corporation] to set the example, and for their peers…so that they move forward as organisations, and all the people within them help them to make that happen’ (R09).

One participant believed that true commitment by businesses to act as role models is lacking (R04).

Finally, two participants noted that an important facet of following the example of a leader is to trust that leader (R13, R14).
2.4.1.11 Larger systems

Participants believed that dominant cultural systems often exert an invisible pressure to perform behaviours which are less environmentally sound. There were a range of systems mentioned. One participant cited a lack of environmentally-preferred consumer options which hinders environmentally sound consumer behaviour (R13) and two participants mentioned that it is often cheaper and easier to perform the less environmentally-preferred option, which sends the wrong message (R09, R16):

‘The dominant message is, ‘Throw it all in the skip’, that’s the best way, the quickest, easiest, cheapest way to get rid of it’ (R09).

Many of these systems are prevailing, such as the example of plastic bags:

‘…plastic bags is a good one. There’s been a lot of supposed education at supermarkets this year … You probably saw point-of-sale stickers and signage and PA announcements and all that, but at the end, the main message people got…is that plastic bags are free and you can have as many as you like. So, the system is still set up to encourage people to use throw-away, disposable bags, and some, most supermarkets aren’t set up to have an area any more where you can actually stand there and pack the stuff…that’s an example of how you might have supposed education, but the overall system is encouraging the complete opposite’ (R09).

Consumerism was cited by six participants as a barrier to EPB performance, in terms of the marketing and advertising pressure to consume (R01, R06, R09, R12, R15, R17):

‘…the people involved in education might be doing their best, but…we all watch tv and get bombarded by all these advertising things, so we live in a consumer society…There’s billions of dollars spent to make that keep happening…It's the big contextual constraints, that's what the problem is’ (R09).

R01 thought that this consumerism led to anti-environmental core values:

‘And then there’s the overall climate created by marketing and advertising in terms of consumerism, including just the ‘Be selfish’, you know, ‘Do it for yourself’, ‘I deserve it’, you know, that whole style of advertising where they’re actually encouraging
people, I mean, yeah, if people just are basically short term and selfish, we’re never going to deal with environmental problems and unfortunately millions and millions of dollars are being spent in advertising to encourage people to be exactly that way’ (R01).

In addition, two participants noted that a consumer lifestyle is desired by many members of the public (R06, R12):

‘…our society has come from baby boomers, you know, we’ve never had to not have anything or want anything. We’ve never known what its like to go without, to not have a resource. So the generation of people that we’re looking at are used to high consumer marketing, you know, you have to have this, you have to look like that’ (R12).

Conversely, larger cultural systems can also foster EPB performance. One participant (R13) noted that governing bodies can create a favourable climate for particular EPBs, for example, when determining pricing.

2.4.1.12 Attitudes

Very few participants mentioned attitudes as an influential factor regarding EPBs (R02, R08, R09, R14).

The responses mentioning attitudes are as follows. One participant cited attitudes as a barrier to EPB performance but did not describe specifically which attitudes (R08), two participants believed that other factors may be more important than attitudes in determining EPB performance (R02, R14), and one participant believed that attitudes often followed actions (R14):

‘I wonder if Nike’s maybe got it right? They don’t worry about people thinking, they just say, ‘Just Do It’. And once you do it, and once you’ve got Nikes on, suddenly Nikes are the best shoes in the world, and you reinforce that attitude follows action, maybe, not the other way around’ (R14).

R09 believed that attitudes are shifting somewhat to be more sensitive to environmental issues, and that this may facilitate EPB performance:
‘...its also the...frameworks changing that allow individuals to change their behaviour. In some of those...the frameworks...are perceptual, so, like, eight years ago, people wouldn’t have wanted to talk about zero waste, but that change has happened...there has been movement in terms of how people think about waste’ (R09).

2.4.1.13 Other factors

A number of other factors were cited by a small number of participants. Although they did not emerge in the analysis as major factors, they have been listed here for the sake of completeness.

i) Relevance
The perception of the relevance of environmental issues to personal lives was cited as an influential factor on EPB performance by three participants. This may take the form of the environment being relevant to their particular value set (R17), or it may be that people can see a direct physical impact of environmental problems in their lives (R08, R18).

‘I suppose the education, too, for the general public is about what impacts their lives. Some people aren’t going to care about an environmental issue if they can’t see it, or taste it, or smell it, or experience it. Where if it’s right on someone’s doorstep, take a Pacific island somewhere that’s losing their actual island through, you know, rising sea levels, global warming, they might take an interest in that, whereas someone who’s not affected by that can’t really see what the fuss is all about’ (R08).

ii) Habit
Two participants (R09, R11) cited habit as a factor that predicted EPB performance.

‘...for some people, some types of behaviour become unconscious, and, like, you forget where they came from, and an example of that might be curbside recycling, where a lot of people will do that without being conscious of doing it’ (R09).

Conversely, two participants cited habitual non-environmentally preferred acts as a barrier to EPB performance (R10, R17).
iii) Upbringing

Three participants (R10, R11, R12) thought that when people are brought up within an environmentally sensitive context, they are more likely to perform EPBs.

‘And we get a lot of young people who are just being brought up with environmental programs now, so, now that they’re coming into being more independent, they want to know how to put that practice into their lifestyle’ (R10).

iv) Single responses

A number of drivers and inhibitors for EPBs were mentioned by only one or two participants. The drivers for EPB performance mentioned were having experienced a connection to Aboriginal culture (R06), involvement with civil rights or women’s rights movements, as environmental issues can be associated with these (R07), gender, with women adopting EPBs more quickly (R13) and a desire to be good housekeepers and thus avoid waste (R17). R03 described his philosophy about EPB performance as being about individuals understanding how their environment is socially constructed and then becoming responsible for their own personal construction, both in their beliefs about, and actions they take, in relation to the social context and objects around themselves.

In terms of barriers, one participant (R08) believed that the vast space available in Australia makes it difficult for Australians to seriously consider environmental problems as compared to some European countries where physical constraints are more likely to highlight environmental issues, and one participant (R07) described the ‘Tragedy of the Commons’, that is, when land is available for use by all, people will allow degradation of the larger sphere in an attempt to gain the greatest benefit for themselves. One participant (R10) believed that environmentalists can sometimes be the barrier to the very behaviours they are trying to encourage via ‘preaching’.

Finally, two participants noted that there are individuals who will simply always resist adopting EPBs (R12, R17).
2.4.2 Factors which allow or prevent EPB performance

In addition to those factors outlined in Section 2.4.1, which can encourage or discourage the performance of EPBs, participants mentioned three factors which can allow or prevent the performance of certain EPBs. They have been conceptualised here as a separate category. Factors that allow/prevent the expression of EPBs are those that permit a particular behaviour to be possible at all. Those that encourage/discourage the expression of EPBs are things that nudge a person to behave a particular way within the context of the behaviour being a possibility among other possible behavioural choices, as then there is no option to perform the type of behaviour under investigation. The model acknowledges that some behaviours are utterly prevented from being expressed, for example, choosing to travel to work on public transport rather than in a private vehicle where there is no public transport system in the area in which an individual lives. Systems allowing the expression of EPBs are required in order for EPBs to occur. The current model examines the drivers that lead to the more environmentally preferred choice in situations where options exist. This will assist practitioners in their work encouraging people to choose the most environmentally friendly choice available.

2.4.2.1 Presence of infrastructure and services

The presence of appropriate infrastructure and services was cited as a prerequisite to some EPBs by nine participants (R01, R04, R05, R07, R09, R12, R13, R14, R15, R16).

‘My perspective on it is that its partly about individuals changing behaviour, but its more about community, or social change, and changing the systems that allow people to change their individual behaviour. So, like for example, at [name of large corporation], before there were recycling systems set up, people were constrained in how they behaved as individuals, but once there were good systems set up for recycling paper and bottles and cans people could participate in recycling and composting and whatever, but they couldn’t have done that as individuals without the systems being in place’ (R09).

Participants felt that, overall, built environments in Australia, particularly residential homes, were not adequately equipped with environmental infrastructure (R09, R12, R17).
2.4.2.2 Cost

The cost of performing EPBs can be prohibitive to performing them (R14, R16, R17). This can be relevant for a range of behaviours, including installing technology such as a grey water recycling facility (R10), land management (R11), and general purchases (R07).

2.4.2.3 Empowerment

Although the concept of empowerment usually refers to an individual’s perception that they are able to perform a particular behaviour, there are also instances where people are realistically not empowered to perform an EPB, whether this is due to not having the required skills (R05), or whether they do not have the means to perform the behaviour (R13). Also, behaviours may actually be prohibitively difficult (as opposed to being perceived as too difficult), for instance, for the elderly or disabled (R11), for those who live in an isolated community such as a rural area where information is not available (R11), or where there are simply difficult or complex requirements (R07).

2.4.3 Important for factors to appear together

Most participants noted that it is necessary for factors to appear together to be effective in encouraging EPB performance. For example, R14 described a ‘tripod of environmental behaviour’:

‘Another classic barrier is…the tripod…of ‘education’, ‘infrastructure’ and ‘regulation’…If you miss one of those legs, the chair falls over, its like a bar stool, yeah?…so if I could know everything I need to know about recycling, but if I don’t have a recycling service, I can’t recycle…If I have a recycling service that’s really good, but I don’t know how to use it, that’s a barrier’ (R14).

In particular, many participants thought that information should be disseminated in conjunction with other supports.

Four participants mentioned loosely understood theories made up of sets of factors that they use to guide their work. These are listed in Table 2.1 below. Although the
origins of these sets, and whether they had been tested was only known by one, their use by participants indicates their belief in behaviour being motivated by a combination of factors.

Table 2.1

**Sets of factors utilized by participants in their work to foster more sustainable behaviours**

<table>
<thead>
<tr>
<th>Participant</th>
<th>Factors in theory</th>
</tr>
</thead>
</table>
| R01         | - Awareness of the issues.  
- A belief that you can do something useful about the issues.  
- Having basic knowledge needed in order to choose the most effective strategy.  
- Mental skills, such as decision-making and problem solving skills etc.  
- Skills that enable you to work with others, eg. teamwork, leadership and people skills etc. |
| R07         | Earth Education (attributed to Professor Steve Van Matre)  
- Head (learn)  
- Heart (emotions)  
- Hands (change behaviour)  
Earth Education hooks these concepts together, and makes a connection between them. It is an holistic approach. It looks at inconstancies between attitudes and behaviour. It also examines the affective part of learning. |
| R07         | The 5 Principals of Environmental Education (source unknown)  
- Economics  
- Encouragement (incentives)  
- Engineering solutions (infrastructure)  
- Education (the programs themselves)  
- Enforcement |
| R12         | - Awareness  
- Knowledge  
- Skills  
- Attitudes  
- Values  
- Actions (participating in, involved in decision making, connection with the action) |
| R14         | The tripod of Environmental Education:  
- Education  
- Infrastructure  
- Regulation |
2.4.4 Differing drivers

More than half of all participants noted that drivers to perform EPBs vary for different individuals (R02, R04, R05, R07, R08, R09, R12, R13, R14, R16).

‘The interesting thing is, of course, different people have different triggers…I can think about a couple of strategies that seem to work for lots of people, but, by no means work for everybody’ (R04).

One participant (R08) listed some of the possible triggers:

‘I suppose you’ve got those different categories of people, the ones that personally care, the ones that follow the leader, the ones that don’t want to be seen to be falling behind other areas of the business, those that can see that it actually makes sense, dollars and cents’ (R08).

Three participants believed that different drivers may exist for the same person at different times (R02, R07, R09):

‘…it depends where that person’s at. It’s like, when you go to dinner, and someone puts out a menu, people who may generally choose the same thing will still look and go ‘Oh, I’ll have that’...it totally depends on how they’re feeling and what is going on for them’ (R02).

R14 said that there were varying triggers for different groups, such as councils, businesses and individuals.

One participant noted that it can depend on the behaviour itself (R12).

2.4.5 Subjective nature of the data

Consistent with a qualitative research approach, the data gathered was of a subjective nature. Although participants spoke about the factors that they believed affected the frequency of the performance of EPBs, they readily reported that they were unaware of a direct link between their work about encouraging EPBs and its effect on the target behaviour of their target audiences. When answering questions,
participants drew on personal observation, occasional anecdotal feedback, or intuition.

‘There’s a lot of things that people have done in environmental education over the years that I think probably haven’t been well documented. It’s kind of intuitive. You know, you just do what you think is right’ (R07).

Five participants reported that their work was never formally evaluated (R04, R07, R10, R11, R12). Additionally, five participants indicated that they were either confused about, or not aware of, the consequences of their educational efforts on behaviour (R02, R04, R06, R07, R11).

‘...I’ve done a lot of talks on waste minimisation [but] I can’t tell what people go home and do’ (R06).

Participants were using strategies to encourage EPB performance that they either created themselves, or were somewhat guided by their educational background including loose guidance from untested theories (listed in Table 2.1).

2.5 Discussion

The aim of Study 1, to catalogue knowledge held by experts in the field of environmental education about the drivers and inhibitors of EPB performance, was achieved. A large number of categories emerged from the data, providing a list of factors as appear in the left column of Table 2.2, below. Many of the factors were further broken down into sub-factors. In addition, an important distinction was made between factors which encourage or inhibit the performance of EPBs, and those that can completely prevent their expression. Preventative factors are presented in the left column of Table 2.3. Tables 2.2 and 2.3 also include correspondence of the factors identified in the current study with those identified in the literature review (as per Chapter 1).
Table 2.2

**EPB predictive factors identified in Study 1, and correspondence with factors identified in the literature review**

<table>
<thead>
<tr>
<th>EPB predictive factors identified in Study 1</th>
<th>Corresponding EPB predictive factors identified in the literature review</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social norms</td>
<td>Social norms</td>
</tr>
<tr>
<td>Incentives</td>
<td>[Opposite to] Intrinsic motivation</td>
</tr>
<tr>
<td>Values</td>
<td>Values</td>
</tr>
<tr>
<td>Connection with nature</td>
<td>Connection to the environment</td>
</tr>
<tr>
<td>Convenience</td>
<td>Convenience</td>
</tr>
<tr>
<td>Infrastructure and services</td>
<td>Convenience</td>
</tr>
<tr>
<td>Knowledge</td>
<td>Environmental knowledge</td>
</tr>
<tr>
<td></td>
<td>Procedural knowledge</td>
</tr>
<tr>
<td>Empowerment</td>
<td>Self-efficacy</td>
</tr>
<tr>
<td>Regulation</td>
<td>Leadership</td>
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<td>Leadership</td>
<td>Leadership</td>
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<tr>
<td>Larger systems</td>
<td>Cultural context</td>
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<tr>
<td>Attitudes</td>
<td>Attitudes</td>
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<tr>
<td>Relevance</td>
<td>-</td>
</tr>
<tr>
<td>Habit</td>
<td>Past behaviour</td>
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<tr>
<td>Upbringing</td>
<td>-</td>
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</tbody>
</table>

Table 2.3

**EPB preventative factors identified in Study 1, and correspondence with factors identified in the literature review**

<table>
<thead>
<tr>
<th>EPB preventative factors identified in Study 1</th>
<th>Corresponding EPB predictive factors identified in the literature review</th>
</tr>
</thead>
<tbody>
<tr>
<td>Presence of infrastructure or services</td>
<td>Convenience</td>
</tr>
<tr>
<td>Cost</td>
<td>Convenience</td>
</tr>
<tr>
<td>Empowerment</td>
<td>Self-efficacy</td>
</tr>
</tbody>
</table>

Despite a lack of communication between scientific and professional practitioners at the time the Study 1 was conducted, all participants spontaneously provided at least some of the same factors as those contained in the literature. Practitioners’ work was primarily informed by trial and error, discussion with other professionals and a small amount of guidance from educational theories, but generally without access to the psychological conservation behaviour literature. The overlap of factors yielded in Study 1 lends great support to the influence of these predictive factors.
Convenience, procedural knowledge, leadership, self-efficacy and values were deemed important influential factors in the expression of EPBs in both the literature and Study 1. The literature also provided a theoretical framework for values, and specified a self-transcendent orientation as being a positive predictor of EPB performance. The results of Study 1 place a much larger emphasis on the importance of social norms, as compared to the literature. The relative strength of these factors warrants further investigation.

The responses of many participants were the same, or very similar. This may be a result of professional collaboration among participants, but may also indicate that a majority had observed similar factors influencing behaviour, suggesting a strong influence of those factors.

Two factors that emerged from the Study 1 data that had not been identified in the literature were the direct relevance of environmental issues to individuals’ daily lives and the influence of environmental awareness in upbringing. These factors were mentioned by only a very small proportion of participants, with three responses each. Both are very broad concepts, but that are very specific to individuals. They may merit further investigation.

Two factors included in the literature review that were not identified by participants were demographics and feeling personal responsibility for environmental problems. As neither of these emerged as strong predictors in the literature review, this omission by participants may indicate that they are not important predictive factors for EPB performance.

Although participants did not identify nature experience as a predictive factor for EPB performance, it nevertheless emerged as a powerful force. Many participants incorporated spending time in natural settings as an inherent part of a feeling of a spiritual connection with the natural environment. In addition, the participants, people whose everyday work comprises an EPB, spoke of their own nature experiences in an emotional manner.

Intrinsic motivation did not emerge from the data as a motivating factor for EPB performance, but the contrasting extrinsic motivation of incentives emerged as a large and multi-faceted predictive factor. The finding that incentives are a powerful
predictor of EPB performance does not conflict with that of the literature, which also acknowledges the influence of external rewards. The literature, however, cautions that behaviour produced in response to incentives is likely to disappear when the incentive is removed. This may be information that would be useful to disseminate to practitioners.

The small response for an attitude factor may have been influenced by a quirk of the interview question, in that the interviewer specifically asked participants to focus on the factors they believed influenced behaviour, as opposed to the factors they believed influenced the formation of environmental attitudes. Participants may have been confused into neglecting discussion on the predictive power of attitudes on behaviour. Alternatively, participants might have included this factor in their discussion of ‘values’, as the two concepts may have been conceptually identical to participants due to their similarity in lay definitions. Finally, they may not have mentioned attitudes as they felt this was not an important factor.

More than half of all participants spontaneously and passionately elaborated on a strong personal feeling of connection to the environment. Participants were also enthusiastic about their work in protecting the environment and had actively chosen environmental protection work at a time when conservation behaviour careers were obscure. This finding possibly indicates that the participants have ‘activist’ personalities. Although they did not make an explicit connection between their passionate personal feeling of connectedness to the natural environment and their own EPB performance, the overlap may indicate that a feeling of connection to the environment is a precursor to environmental activism. The literature suggests that activist behaviours are a stand-alone category of EPBs. The results of Study 1 may indicate that the factor of feeling connected to the environment is a strong predictor for the performance of activist EPBs. This hypothesis warrants further investigation.

Participants noted that factors did not affect behaviour in isolation, but rather, combinations of factors were required to motivate or inhibit EPB performance. This finding lends further support to the rationale of the broader research project for the development of a cohesive model for the prediction of EPBs, incorporating a range of factors. The finding that different combinations of factors may be required for different situations or different individuals, however, indicates the complexity of behaviour prediction, and the limited power of a model to predict all behaviours.
The findings that participants were using subjective ideas to guide the development of behaviour change programs rather than being guided by research, and that they observed a lack of a scientific approach to, and evaluation of, their own work indicates a need for input from the research community, including theory and program evaluation, which could greatly increase the effectiveness of environmental education programs. Evaluation of programs would then be able to further refine theory. This provides a potential focus for practically useful future research.

The distinction which emerged between factors which allow or prevent behaviours and those which encourage or inhibit them is an important one. Although seemingly obvious in hindsight, this is not a distinction that was drawn explicitly by the interview participants, or has appeared in the literature. Awareness of this distinction should be a vital consideration in program planning, as if it is overlooked, individuals may not be able to perform a range of EPBs that they would otherwise choose.

One limitation of the current research involved the inexperience of the primary researcher. Qualitative research is an art where greater skill of an interviewer can yield more detailed results. This research could be repeated with a more experienced researcher to possibly glean more detailed results.

This study was conducted in 2002-2003. In the intervening years the field of environmental education has changed enormously in Australia and around the world. It has grown in size and scope, sustainability units are more commonly offered in schools and workplaces are more likely to have an environmental policy. In addition, awareness of environmental issues by the public, particularly in relation to climate change, has increased. Due to these changes, results may differ if this study was repeated in the current context. It would therefore be useful for future research to repeat this research in the current temporal context.

Another limitation of the study was that participants were recruited from Melbourne only, and not from rural areas, other cities in Australia or other countries. Melbourne has a cosmopolitan, urban, left-leaning and affluent population, which may have resulted in the study conclusions being tailored for this type of population only. Future studies could compare similar information from other types of populations around Australia and around the world in order to better tailor the results to share with educators from different locations.
A major limitation of the study was a bias toward educational approaches to fostering EPB performance, both in participant selection and interview question selection. Future research could address this by expanding the sample type in a similar study and also by asking questions about a range of behaviour change approaches.

This study contributes to the overall aims of the larger research project by providing information to be incorporated into a model of EPB performance, and by revealing results relevant to an Australian population. Importantly, the results from Study 1 now need to be combined with the literature to form a cohesive and comprehensive model of the predictors of EPBs. This is the next phase of the research in the current thesis.
Chapter 3

Development of a Model

Chapter 3 fulfils the first research aim of contributing new theory to the field of conservation psychology by developing a comprehensive predictive model of EPB performance. This will be achieved by combining the results from Study 1 with the literature. The model will be tested in a further study.

3.1 Rationale for the development of a model

The rationale for the development of a comprehensive model for the prediction of EPB performance arises from the overall rationale for the current research (Section 1.4). At the time that this research was conducted, there was no empirically supported theoretical model for EPB prediction that included a comprehensive listing of psychological as well as contextual factors. This was a striking omission in the literature because both sets of factors are understood to be precursors to EPB performance by the research community, as identified in the literature review, as well as by practitioners, as noted by the results of Study 1. Related to the lack of such a model, no solid theoretical framework including contextual as well as psychological components of EPB drivers existed in the literature.

Existing attitude theories were considered insufficient to predict real-world EPB performance as so many factors in addition to the ones contained in those theories were expected to impact. Thus, a theoretical reassessment was undertaken that incorporated these many factors. Based on the literature findings, as well as information gathered in Study 1 from environmental behaviour specialists, a proposed Model has been devised. This model is a simple collection of factors that may impact on EPB performance. It differs theoretically from any previous conceptualization of predicting EPB performance in that it incorporates a much more comprehensive range of predictors.

The relationships between factors are unknown, as this range of factors has not been investigated together previously. However, based on past research that has
investigated a selected number of factors, some mediated relationships are expected.

A single model has been deemed appropriate to predict all EPBs, with the exception of activist behaviours, as per Stern (2000). It is possible that customizing the model for different clusters of EPBs may be required as different clusters may have different drivers (see Section 1.3.1). In addition, results from Study 1 indicated the importance of distinguishing between factors that can inhibit or encourage EPB performance, and those which can completely prevent their expression. The model will assume that there are no prohibitive barriers to the behaviour in question, as the study aims to investigate what motivates the performance of EPBs when there is a behavioural choice available.

3.2 Development of an original model

The model development involved consolidating the combined information and insights from research as identified in the literature review and from practitioners as identified in Study 1. The full complement of factors from which chosen factors were selected is contained in Table 3.1 below.
Table 3.1

Complete list of factors identified in the current research

<table>
<thead>
<tr>
<th>Factors identified in the literature</th>
<th>Factors identified in Study 1</th>
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</thead>
<tbody>
<tr>
<td>Convenience</td>
<td>Convenience / infrastructure</td>
</tr>
<tr>
<td>Social norms</td>
<td>Social norms</td>
</tr>
<tr>
<td>Leadership</td>
<td>Leadership / regulation</td>
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<tr>
<td>Nature experience</td>
<td></td>
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<tr>
<td>Demographics</td>
<td></td>
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<tr>
<td>Cultural context</td>
<td>Larger systems</td>
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<tr>
<td>Attitudes</td>
<td>Attitudes</td>
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<tr>
<td>Values</td>
<td>Values</td>
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<tr>
<td>Environmental knowledge</td>
<td>Knowledge</td>
</tr>
<tr>
<td>Procedural knowledge</td>
<td>Knowledge</td>
</tr>
<tr>
<td>Self-efficacy</td>
<td>Empowerment</td>
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<tr>
<td>Connection to the environment</td>
<td>Connection with nature</td>
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<tr>
<td>Past behaviour</td>
<td>Habit</td>
</tr>
<tr>
<td>Personal responsibility</td>
<td></td>
</tr>
<tr>
<td>Intrinsic motivation</td>
<td>Incentives (opposite to intrinsic motivation)</td>
</tr>
<tr>
<td></td>
<td>Relevance</td>
</tr>
<tr>
<td></td>
<td>Upbringing</td>
</tr>
<tr>
<td>Identity</td>
<td></td>
</tr>
</tbody>
</table>

The overlap of factors identified as predictors in the literature as predictors with those that emerged from the qualitative study with practitioners lends strength to the potential of those factors to be drivers of EPB performance. The factors that were found to be influential by both are: social norms, convenience, leadership, wider culture, attitudes, values, environmental knowledge, procedural knowledge, self-efficacy, connection to the environment, habit and intrinsic motivation. These factors were all included in the model, with the exception of wider culture and intrinsic motivation.
Wider culture was not included as it is too broad a factor to be included in a predictive model. Any model would require testing within various cultural contexts to assess its relative predictive power. It may need to be adjusted or re-conceptualized for differing cultures. The model presented here was developed based on modern Western culture.

Intrinsic motivation was not included as a stand alone factor as it is conceptually contained in the self-efficacy factor, that is, possessing intrinsic motivation to perform EPBs corresponds with a feeling of doing it because it makes a difference, it is worth doing for its own sake.

Identity was not included in the final model as this has emerged in the literature after the theory was developed in 2006.

In addition, two factors which were identified in the literature review, but did not emerge in Study 1, were included in the proposed model, being nature experience and demographics. Nature experience was included as it was consistently found to be related to EPB performance in the literature, as well as taking into account the striking emotional response that participants of Study 1 experienced when spontaneously speaking of their nature experiences in relation to feeling connected to nature. Demographics were included as a standard factor for the sake of completeness and interest, but with a view to eliminating them from the final model if they were found to add little or no predictive power after testing.

The chosen factors were conceptually divided into contextual and psychological factors. Three psychological factors, values, environmental knowledge and connection to the environment had been identified in the literature as factors that may affect EPB performance indirectly via attitudes. They are presented in this expected format in the proposed model.

Three factors, personal responsibility, relevance and upbringing, which emerged either from the literature or Study 1, but not both, were omitted from the proposed model as they did not emerge as strong factors.

Certain factors were expected to be more influential than others, again based on the relative weighting given to them by both the literature and Study 1. These factors are highlighted in the proposed model.
The complete proposed model is diagrammatically presented in Figure 3.1. It is called the ‘Behaviour with Environmentally Caring Outcomes Model’, or the ‘B-ECO Model’.
Figure 3.1. Proposed B-ECO Model, a model of the predictors for the performance of EPBs

Contextual factors

1. Convenience
2. Social norms (actual and perceived)
3. Leadership
4. Nature experience
5. Demographics

Psychological factors

6. Values
7. Environmental knowledge
8. Connection to the environment
9. Attitude
10. Procedural information
11. Self-efficacy
12. Habit

EPB

Figure 3.1. Contextual and psychological variables are specified in the proposed B-ECO Model. Three factors are believed to be mediated by attitudes in their effect on EPBs. The proposed B-ECO Model assumes no prohibitive barriers are in place, particularly the absence of appropriate systems or infrastructure, cost or constraints of physical ability. Factors proposed to be more powerful predictors appear in bold. This model is not proposed to predict activist EPBs.
The proposed B-ECO Model of the predictors for the performance of EPBs contains a greater number of factors than previous models. In the current model, contextual influences are identified as separate factors rather than grouped together as a single factor. It also includes a larger number of psychological factors than previous models. Increasing the number and type of factors may increase the predictive power of the model (Weigel, 1985). It may also be more practically useful to practitioners than models containing a few, broad categories of factors by providing more specific areas on which to focus when planning behaviour-change programs.

In a review paper, Olander and Thogersen (1995) have noted that changes may occur over time regarding the mechanisms by which factors impact on EPB performance, for instance, that social norms are a powerful predictor of environmental intent when people are first introduced to a behaviour change concept, but that as time passes, the motivation to perform the action becomes internalized. Thus, different emphases on particular factors may be required at differing times.

The next phase of the overall research project is to empirically test the proposed B-ECO Model for validity and reliability, and then to revise the model according to findings.
Chapter 4

Study 2 – Creation of a survey tool

4.1 Introduction and rationale

Once the proposed B-ECO Model was developed (see Chapter 3), it was important to test it empirically. As no survey tool existed to test the model, there was a need to develop a reliable and valid questionnaire. Study 2 was undertaken to create such a questionnaire.

4.2 Aim

There was one aim for Study 2:
- To create a survey tool to enable the examination of the proposed B-ECO Model in a subsequent study.

4.3 Methodology

The methodology for Study 2 comprised two stages:

Stage 1 - Compilation of a pilot questionnaire.
Stage 2 - Testing and refining the pilot questionnaire to create a final questionnaire.

4.3.1 Stage 1 – Compilation of a pilot questionnaire

The processes and reasoning used to create the questionnaire are detailed below. Items were developed to measure each factor in the proposed B-ECO Model. Item development, and the items themselves, are listed in the order that factors appear in the proposed B-ECO Model. They were not presented in this order in the pilot questionnaire. The final pilot questionnaire in the format that it was presented to respondents can be viewed in Appendix C.
There are 12 predictive factors in the proposed B-ECO Model, as well as a ‘behaviour’ factor (see Figure 3.1). Many factors in the model are comprised of two or more sub-factors. Although a considered selection of sub-factors were chosen to be included in the study, a large number remained for the sake of thoroughness. Pilot items were created to measure each sub-factor, or factor where there were no sub-factors, in relation to two behaviours and/or the natural environment in general. These groups of items, as well as each behaviour, comprised the variables for analysis. An example of a variable is ‘ease of double-sided printing’, which is a sub-factor of ‘convenience’.

Existing scales were used where available. It was necessary to create original items to measure the remaining variables. Original items were developed based on information from the literature and the results of Study 1.

With the exception of items to measure behaviours, values, environmental knowledge, demographics and the personal reaction inventory, items appeared in a section of the questionnaire labelled ‘Attitudes’. This is a large section of the questionnaire labelled thus for the benefit of the lay respondents, and which is not equivalent to the factor in the proposed B-ECO Model also labelled ‘attitudes’. Two, three or four items per variable were included in this section, comprising a selection of positively and negatively worded items. All items in this section required responses on a five-point Likert scale comprising ‘strongly agree’, ‘agree’, ‘neither agree nor disagree’, ‘disagree’ or ‘strongly disagree’.

In addition to measuring the factors from the proposed B-ECO Model, items to measure an environmental activist personality were also included, with a view to comparing the results of those who identified as activists with the general population to potentially identify a separate predictive model for activist EPBs, and the Personal Reaction Inventory was included to gauge a social desirability effect.

Variable names appear in italics above the items used to measure them. A summary table of all the variables included in the study is included at the end of this section.
4.3.1.1  EPB performance

The choice of EPBs to be tested was based on a number of considerations.

McKenzie-Mohr (2000a, 2000b) distinguishes between two types of behaviours that benefit the natural environment: One-time actions, such as buying an energy efficient heater, and repetitive actions, such as cycling to work. Repetitive actions were chosen for the current study. It is difficult to capture one-time actions due to their rare occurrence. Repetitive actions, by their nature, occur often and are easier to capture. They were the most appropriate choice given the scope of the current study.

Behaviour occurring within an office was chosen as this is not an area that has been studied extensively. In addition, office staff were thought to be an easily accessible sample.

It was also important to select a behaviour with a large impact, not simply an interesting or salient one (McKenzie-Mohr, 2000a; Stern, 1992). Behaviours involving paper use within offices have a large impact due to the enormous volumes of paper consumed within offices.

Two behaviours, rather than one, were used to more thoroughly test the proposed B-ECO Model. The possible existence of clusters of EPBs (see Section 1.3.1) led to the selection of two similar behaviours in order to make their results comparable. Items relating to the two behaviours were formulated to be as similar to one another as possible to allow for greater comparability.

The EPBs to be tested were selected in consultation with Environment Officers at the workplaces in which the questionnaires were to be administered in order to ensure that they were appropriate for the target respondents. The two EPBs chosen for the pilot questionnaire were double-sided printing, which is environmentally preferable to single-sided printing, and reading text on a computer screen, which is environmentally preferable to printing documents to read. These behaviours are the preferred options as they save paper.
The original items included in the pilot questionnaire to measure ‘double-sided printing’ and ‘reading on the screen’ were:

- I print double-sided at work.
- I read text on the screen, rather than printing it out for reading.

A five-point Likert scale comprising ‘always’, ‘often’, ‘sometimes’, ‘rarely’ and ‘never’ was used to collect responses to these two items.

‘Double-sided printing’ comprises two processes – the printing of a document and the reading of that document. The relevant process was chosen for different sections of the questionnaire, for example, the printing process was salient when developing items on the sub-factor ‘infrastructure’ (see below), but the reading process was salient when developing items on the sub-factor ‘comfort’ (see below).

4.3.1.2 Convenience

Convenience was divided into three sub-factors:

- Comfort: how comfortable the outcome is for a person performing a particular behaviour,
- Ease: how easy or difficult the task is to perform, and
- Infrastructure: how convenient the infrastructure is in terms of facilitating the performance of the behaviour.

‘Comfort’ emerged as an important sub-factor mainly from previous studies which focused on energy use, and particularly the comfort involved in heating or cooling one’s home. The ‘ease’ sub-factor emerged predominantly from the literature on recycling, especially when comparing separating waste to a co-mingled system. In the context of items on paper use within an office, these two sub-factors at first appeared to be almost indistinguishable from one another. A distinction was made between ‘comfort’ relating to physical comfort, which is often associated with an affective state, and ‘ease’ being a cognitive decision. The items to measure these two sub-factors, therefore, reflected this affective/cognitive distinction, with the items to measure ‘comfort’ including ‘I find it annoying…’, and ‘I don’t mind…’, and those to measure ‘ease’ included ‘It is easy to…’, and ‘It is a lot of effort to…’.
‘Infrastructure’ was relevant to ‘double-sided printing’ as it is necessary to have access to a printer that has the capacity to print double-sided in order to be able to perform this behaviour, as well as the infrastructure being convenient to use. Although the proposed B-ECO Model assumes that the relevant infrastructure is in place, it was necessary to check this for the purposes of testing the model.

As the final questionnaire was planned to be answered electronically, items asking about the availability of infrastructure relating to ‘reading on the screen’ were not included, as all respondents would necessarily have access to a computer – the only infrastructure required to perform this behaviour.

Original convenience variables and items were as follows:

**Comfort ds** (where ‘ds’ stands for ‘double-sided printing’)
- I don’t mind if text is printed double or single-sided.
- I find it annoying to read documents that have been printed double-sided.
- I find it more comfortable to read documents when they have been printed on only one side of the page.

**Comfort read** (where ‘read’ stands for ‘reading on the screen’)
- I don’t mind whether I read documents on the screen or on paper.
- I find it annoying to read text on the screen.
- It is less strain on my eyes to read text on paper, rather than on the screen.

**Ease ds**
- It is easy to print double-sided.
- I find it difficult to work out how to print double-sided.
- It is a lot of effort to go through the computer procedures that would enable me to print double-sided.

**Ease read**
- It is easy to read text on the screen.
- I find it harder to read text on the screen than I do on paper.
- I find it less effort to read text on paper than I do on the screen.
**Infrastructure ds**

The Model assumes that infrastructure is available. This variable measures level of accessibility:

- The printer that my computer is connected to is able to print double-sided.
- There are facilities for me to use at work that allow double-sided printing.
- A printer which would allow double-sided printing is further away from my desk than one which only allows single-sided printing.
- My computer is not set up to automatically print double-sided.

### 4.3.1.3 Social norms

Original items for ‘social norms’ were created, as presented below. An attempt was made to capture various elements of social norms, such as external pressure from others as well as observation of others, and personal social norms as well as group social norms.

**Social norms ds**

- At least some of my work colleagues give me a hard time if they see me printing single-sided.
- At least some of my work colleagues routinely print double-sided.
- People at work don't care whether or not I print double-sided.
- The culture at my workplace doesn't encourage double-sided printing.

**Social norms read**

- At least some of my work colleagues give me a hard time if they see me printing text out for reading.
- At least some of my work colleagues routinely read on the screen.
- People at work don't care whether or not I read on the screen.
- The culture at my workplace doesn't encourage reading on the screen.
4.3.1.4 Leadership

‘Leadership’ was divided into five sub-factors comprising different levels of leadership, being:

- Business leadership specific: Asking about the perceived leadership of upper management on the specific behaviours.
- Business leadership intermediate: Asking about the perceived leadership of upper management on paper use overall.
- Business leadership general: Asking about the perceived leadership of upper management on the environment in general.
- Government leadership intermediate: Asking about the perceived leadership of the Australian Government on paper use overall.
- Government leadership general: Asking about the perceived leadership of the Australian Government on the environment in general.

Due to size constraints, other pertinent aspects of ‘leadership’ that were omitted from the questionnaire included the perceived leadership of local government, and distinguishing between state and federal governments.

Original items were created, as follows:

Business leadership specific ds

- Upper management print documents double-sided.
- Upper management have made double-sided printing a priority issue in my workplace.
- Upper management don't care whether staff print double or single-sided.
- Upper management is unsupportive of double-sided printing.

Business leadership specific read

- Upper management read on the screen rather than on printed pages.
- Upper management have made reading on the screen a priority issue in my workplace.
- Upper management don't care whether staff read on the screen, or whether they print for reading.
- Upper management is unsupportive of reading on the screen.
**Business leadership intermediate**

- Upper management care about reducing paper use in the office.
- Upper management minimise their own paper use.
- As far as I know, upper management have not considered the environmental impact of paper use within our office.
- I have not heard much about paper use in the office from upper management.

**Business leadership general**

- Upper management care about looking after the environment.
- Business practices in my workplace have adapted to take the environment into consideration.
- The environment is not a priority issue for upper management in my workplace.
- Environmental issues are core business at the organisation for which I work.

**Government leadership intermediate**

- Australian governments are serious about people making an effort to reduce the amount of paper used in offices.
- Australian governments aren't concerned about paper use in offices.

**Government leadership general**

- Australian governments are investing money into solving environmental problems.
- Australian governments are working toward protecting the environment.
- Australian governments don't care about the Greenhouse Effect.
- Australian governments aren't working toward protecting the natural environment.

4.3.1.5 Nature experience

Original items were created for ‘*nature experience*’, as follows:

- I have spent a lot of time in natural settings during my life (eg. bushwalks, camping).
- I spend time gardening.
- I spend as little time as possible in wilderness.
- I prefer to holiday in interesting cities than in nature (eg. beaches, forests).
4.3.1.6 Demographics

Demographics were straightforward and asked respondents to choose one prepared category for each of ‘gender’, ‘age’, level of education (‘education’), political orientation (‘political’) and ‘income’.

4.3.1.7 Values

The values scale was taken from Schultz and Zelezney (1999). This was a shortened form of the Schwartz (1994) scale. It consists of a list of 37 values which were selected ‘…based on the empirical locations of each value in regions generated from a series of smallest space analyses reported by Schwartz (1994)’ (Schultz & Zelezny, 1999, p. 259). As per Schwartz (1994), respondents were required to rate each value item separately as a guiding principal in their lives on a 9-point scale from 0 (not important) to 7 (extremely important) or to indicate if they were opposed to the value.

‘Value’ items were divided into four value dimensions, each one a separate variable, as follows:

Self-transcendence

- Protecting the environment.
- A world of beauty.
- Unity with nature.
- Broad minded.
- Helpful.
- Honest.
- Forgiving.
- Loyal.
Self-enhancement

- Social power.
- Authority.
- Wealth.
- Preserving my public image.
- Successful.
- Capable.
- Ambitious.
- Influential.

Openness (openness to change)

- Creativity.
- Curious.
- Freedom.
- Choosing own goals.
- Daring.
- A varied life.
- An exciting life.
- Pleasure.
- Enjoying life.

Tradition

- Devout.
- Respect for tradition.
- Humble.
- Moderate.
- Politeness.
- Honouring parents and elders.
- Obedient.
- Self-discipline.
- Clean.
- National security.
- Social order.
- Family security.
4.3.1.8 Environmental knowledge

Original items were created for *environmental knowledge*. They were designed to test general knowledge about contemporary environmental issues, as follows:

Please tick as many boxes per answer as you think are correct:

1. Climate change is caused by:
   a) An increase in the amount of water vapour in the atmosphere.
   b) An increase in the amount of ‘greenhouse’ gases in the atmosphere.
   c) An increase in the amount of carbon dioxide in the atmosphere.
   d) The burning of fossil fuels.
   e) Using petrol.
   f) Using water.
   g) The use of aerosol cans.
   h) Don’t know.

3. Logging affects drinking water supply because:
   a) Logging doesn’t affect water supply.
   b) Forests catch rainwater which then gathers in rivers to be collected for drinking.
   c) Young trees need more water than older trees.
   d) It results in increased sediment in rivers.
   e) Don’t know.

4. What are the problems with waste going to landfill?
   a) It can contribute to climate change.
   b) Most communities don’t support a landfill in their ‘backyard’.
   c) Many things that end up in landfill could be recycled and the resources used more fully.
   d) There are few problems with waste going to landfill because full tips are covered and the land is used for other purposes.
   e) Don’t know.
4.3.1.9 Connection to the environment

‘Connection to the environment’ was divided into two sub-factors:

- Emotional connection to the environment, which asked about the emotional impact of the environment on the individual, and
- Spiritual connection to the environment, which asked about feeling spiritually connected with nature.

Original items were created, as follows:

*Emotional connection*

- I feel sad when I think about the problems facing the environment.
- I feel happy when I spend time in nature.
- Environmental problems don't affect me emotionally.

*Spiritual connection*

- I feel that I am one with the earth.
- I believe that the earth and my spirit are connected at a deep level.
- I believe that people and nature are separate entities.

4.3.1.10 Attitudes

For the purposes of the questionnaire, ‘attitudes’ were defined as per the TRA, following Schultz and Oskamp (1996), as positive or negative assessments. ‘Attitudes’ was divided into three sub-factors:

- Specific attitudes: Items which ask for assessments of the specific behaviours,
- Intermediate attitudes: Items which ask for assessments on paper use, and
- General attitudes: Items which ask for assessments of the environment as a whole.

The definition of ‘attitudes’ was deliberately focused on direct thoughts, specifically assessments about the behaviours under examination, and how those behaviours relate to the natural environment.
Original items were created, as follows:

**Attitudes specific ds**
- Double-sided printing can have a positive effect on the environment.
- It is a good idea to print double-sided.
- I don't think it's that important to double-side one's printing.

**Attitudes specific read**
- Reading on the screen can have a positive effect on the environment.
- It is a good idea to read on the screen.
- I don't think it's that important to read on the screen.

**Attitudes intermediate**
- Reducing the amount of paper used can have a positive impact on the environment.
- It is important to save as much paper as one can.

**Attitudes general**
- It is important to do what one can to protect the natural environment.
- The environment is an important thing to protect.
- Environmental issues get too much attention in the media.

4.3.1.11 Procedural information

Original items for ‘procedural information’ were created as follows:

**Procedural information ds**
- I know how to change my computer settings to allow double-sided printing.
- I don't know how to print double-sided.

**Procedural information read**
- I possess the required skills to read on the screen.
- I read more effectively on paper than on the screen.
4.3.1.12 Self-efficacy

Two sub-factors of ‘self-efficacy’ were measured. Original items were created to measure perceived power over environmental problems. Locus of control was measured using items selected from a short scale developed by Pettijohn (1996). The items are presented below. The sub-factor of perceived level of skill to perform the specific behaviours under examination had already been adequately assessed by items under the ‘procedural information’ label.

**Power ds**

- Double-sided printing can make a difference to environmental problems.
- Double-sided printing is something positive that I can do for the environment.
- The environmental impact of my double-sided printing is so small that it is not worth doing.
- Even if I always double-side my printing, it won’t save that much paper over the course of my career.

**Power read**

- Reading on the screen can make a difference to environmental problems.
- Reading on the screen is something positive that I can do for the environment.
- The environmental impact of my reading on the screen is so small that it is not worth doing.
- Even if I always read on the screen, it won’t save that much paper over the course of my career.

**Power general**

- Small actions can have a large impact on the environment.
- My personal actions can help the environment.
- Offices aren’t the most important places when considering the link between paper use and environmental issues.
- I am just one person - no matter what I do, it won’t make a difference to the environment.
LOC (Locus of control)

- I do not believe in luck or chance.
- I earn the respect and honours I achieve.
- The success I have is largely a matter of chance.
- My life seems like a series of random events.

4.3.1.13 Habit

Original items were created for ‘habit’, as follows:

**Habit ds**

- I automatically print double-sided.
- I print double-sided without even thinking about it.
- I usually forget to print double-sided.
- It is not a habit of mine to print double-sided.

**Habit read**

- I automatically read on the screen, rather than printing to read.
- I read on the screen without even thinking about it.
- I usually forget to read on the screen.
- It is not a habit of mine to read on the screen.

4.3.1.14 Activism

Original items were created to measure ‘activism’ to investigate differences between those who identify as environmental activists and the general population. Original items were as follows:

**Activism**

- Being an environmental activist is an important part of my identity.
- I participate in environmental campaigning outside of work.
- I am not an environmental activist.
4.3.1.15 Personal reaction inventory

There is some evidence to suggest a social desirability effect in self-reports of EPBs. In the case of curbside recycling, for example, study participants often report higher rates of recycling than those recorded by direct observation of recycling bins (Gamba & Oskamp, 1994; Guerin et al., 2001; Oskamp, 1995b; Oskamp, Burkhardt & Schultz, 1996; Schultz, Hurin & Zelezny, 1998). It was beyond the scope of the current study to conduct direct observations, and self-reports of behaviour were utilized.

Thus, a short form of Crowne and Marlow’s (1960) Personal Reaction Inventory were included to test for levels of social desirability. The thirteen items listed below required a true or false response:

PRI

- I sometimes feel resentful when I don’t get my way.
- On a few occasions, I have given up doing something because I thought too little of my ability.
- There have been times when I felt like rebelling against people in authority even though I knew they were right.
- No matter who I’m talking to, I’m always a good listener.
- I can remember ‘playing sick’ to get out of something.
- There have been occasions when I took advantage of someone.
- I’m always willing to admit it when I make a mistake.
- I sometimes try to get even rather than forgive and forget.
- I am always courteous, even to people who are disagreeable.
- I have never been irked when people expressed ideas very different from my own.
- There have been times when I was quite jealous of the good fortune of others.
- I am sometimes irritated by people who ask favours of me.
- I have never deliberately said something that hurt someone’s feelings.
4.3.1.16 Summary of variables

A list of 42 variables was thus tested by the pilot questionnaire. A summary of these variables is contained in Table 4.1 below. Variables relate either to double-sided printing (these contain the words ‘double-sided’ or ‘ds’ in their variable name), to reading on the screen (these contain the words ‘reading on the screen’ or ‘read’ in their variable name), or to both behaviours.

Table 4.1 List of variables tested in Study 2

<table>
<thead>
<tr>
<th>Factor from the B-ECO Model being measured</th>
<th>Variable name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Behaviour</td>
<td>Double-sided printing</td>
</tr>
<tr>
<td></td>
<td>Reading on the screen</td>
</tr>
<tr>
<td>Convenience</td>
<td>Comfort ds</td>
</tr>
<tr>
<td></td>
<td>Comfort read</td>
</tr>
<tr>
<td></td>
<td>Ease ds</td>
</tr>
<tr>
<td></td>
<td>Ease read</td>
</tr>
<tr>
<td></td>
<td>Infrastructure ds</td>
</tr>
<tr>
<td>Social norms</td>
<td>Social norms ds</td>
</tr>
<tr>
<td></td>
<td>Social norms read</td>
</tr>
<tr>
<td>Leadership</td>
<td>Business leadership specific ds</td>
</tr>
<tr>
<td></td>
<td>Business leadership specific read</td>
</tr>
<tr>
<td></td>
<td>Business leadership intermediate</td>
</tr>
<tr>
<td></td>
<td>Business leadership general</td>
</tr>
<tr>
<td></td>
<td>Government leadership intermediate</td>
</tr>
<tr>
<td></td>
<td>Government leadership general</td>
</tr>
<tr>
<td>Nature experience</td>
<td>Nature experience</td>
</tr>
</tbody>
</table>
Table 4.1 cont.

<table>
<thead>
<tr>
<th>Factor from the B-ECO Model being measured</th>
<th>Variable name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demographics</td>
<td>Gender</td>
</tr>
<tr>
<td></td>
<td>Age</td>
</tr>
<tr>
<td></td>
<td>Education</td>
</tr>
<tr>
<td></td>
<td>Political</td>
</tr>
<tr>
<td></td>
<td>Income</td>
</tr>
<tr>
<td>Values</td>
<td>Self-transcendence</td>
</tr>
<tr>
<td></td>
<td>Self-enhancement</td>
</tr>
<tr>
<td></td>
<td>Openness</td>
</tr>
<tr>
<td></td>
<td>Tradition</td>
</tr>
<tr>
<td>Environmental knowledge</td>
<td>Knowledge</td>
</tr>
<tr>
<td>Connection to the environment</td>
<td>Emotional connection</td>
</tr>
<tr>
<td></td>
<td>Spiritual connection</td>
</tr>
<tr>
<td>Attitudes</td>
<td>Attitudes specific ds</td>
</tr>
<tr>
<td></td>
<td>Attitudes specific read</td>
</tr>
<tr>
<td></td>
<td>Attitudes intermediate</td>
</tr>
<tr>
<td></td>
<td>Attitudes general</td>
</tr>
<tr>
<td>Procedural information</td>
<td>Procedural information ds</td>
</tr>
<tr>
<td></td>
<td>Procedural information read</td>
</tr>
<tr>
<td>Self-efficacy</td>
<td>Power ds</td>
</tr>
<tr>
<td></td>
<td>Power read</td>
</tr>
<tr>
<td></td>
<td>Power general</td>
</tr>
<tr>
<td></td>
<td>LOC</td>
</tr>
<tr>
<td>Habit</td>
<td>Habit ds</td>
</tr>
<tr>
<td></td>
<td>Habit read</td>
</tr>
<tr>
<td>Activism</td>
<td>Activism</td>
</tr>
<tr>
<td>Social desirability</td>
<td>PRI</td>
</tr>
</tbody>
</table>
4.3.2 Stage 2 – Testing the questionnaire for reliability and validity – A pilot study

4.3.2.1 Face validity

Before the pilot questionnaire was distributed to participants, face validity was assessed via discussion with other psychologists including research supervisors and colleagues. Face validity was found to be good, and no changes were made.

4.3.2.2 Participants

Participants were recruited using the snowball method, starting with a convenience sample of family and friends of the researcher. These participants then distributed questionnaires to their work colleagues and friends.

Forty-three participants completed the pilot questionnaire. Demographics of the respondents are contained in Table 4.2. As can be seen from Table 4.2, it was a fairly young, well-educated sample, with slightly more female respondents than male. Politically, they were more left leaning than right leaning, but with a sizable number not caring about politics, and incomes were polarized at the top and bottom levels. Two participants declined to complete the demographic information, and two additional participants declined to complete the item on income.
Table 4.2
Demographic composition of pilot study participants

<table>
<thead>
<tr>
<th>Gender</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>17</td>
</tr>
<tr>
<td>Female</td>
<td>24</td>
</tr>
<tr>
<td>Missing data</td>
<td>2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Age</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>18 – 25</td>
<td>2</td>
</tr>
<tr>
<td>26 – 29</td>
<td>7</td>
</tr>
<tr>
<td>30 – 39</td>
<td>21</td>
</tr>
<tr>
<td>40 – 49</td>
<td>4</td>
</tr>
<tr>
<td>50 – 59</td>
<td>2</td>
</tr>
<tr>
<td>60 or over</td>
<td>5</td>
</tr>
<tr>
<td>Missing data</td>
<td>2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Education</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary</td>
<td>0</td>
</tr>
<tr>
<td>Secondary</td>
<td>1</td>
</tr>
<tr>
<td>Tertiary</td>
<td>40</td>
</tr>
<tr>
<td>Missing data</td>
<td>2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Political orientation</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>More left-wing</td>
<td>21</td>
</tr>
<tr>
<td>More right-wing</td>
<td>4</td>
</tr>
<tr>
<td>I don't care about politics</td>
<td>11</td>
</tr>
<tr>
<td>Neither left nor right leaning</td>
<td>5</td>
</tr>
<tr>
<td>Missing data</td>
<td>2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Income before tax</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>$40,000 or under</td>
<td>17</td>
</tr>
<tr>
<td>$41,000 - $50,000</td>
<td>3</td>
</tr>
<tr>
<td>$51,000 - $60,000</td>
<td>3</td>
</tr>
<tr>
<td>$61,000 - $70,000</td>
<td>4</td>
</tr>
<tr>
<td>$71,000 - $80,000</td>
<td>1</td>
</tr>
<tr>
<td>$81,000 - $90,000</td>
<td>0</td>
</tr>
<tr>
<td>More than $91,000</td>
<td>11</td>
</tr>
<tr>
<td>Missing data</td>
<td>4</td>
</tr>
</tbody>
</table>

4.3.2.3 Method

Participants were supplied with hard copies of the Explanatory Statement, Instructions and the pilot questionnaire (please see Appendices D, E and C respectively). Consent was implied by the voluntary completion of the pilot questionnaire. Five participants requested electronic versions of the paperwork. These participants completed the questionnaires electronically and returned them via e-mail. The remainder of the questionnaires were completed by hand. As requested
on the instruction sheet, respondents also documented the time it took them to complete the questionnaire and many supplied extra written comments.

4.4 Results

Data analysis included both qualitative and quantitative analysis. Results were utilized to amend the questionnaire for the next phase of the research. The data analysis, as well as the ensuing amendments to the questionnaire, follow.

4.4.1 Qualitative analysis

Qualitative analysis comprised informally examining the written comments contributed by respondents. Analysis was informal due to the small amount of data gathered.

A majority of participants commented that they found the questionnaire long and repetitive. As a result, a number of items were removed from the pilot questionnaire (this is in addition to items removed for quantitative considerations, as outlined in the next section). It was deemed that less variables could be included in the current study and explanation for which variables were eliminated is outlined below.

‘Intermediate’ variables were removed from the ‘business leadership’ sub-factor and ‘attitudes’ factor. Both variables measuring perception of ‘government leadership’ were also removed and ‘leadership’ was measured by ‘business leadership’ alone, the most direct form of leadership for the behaviours examined by the questionnaire.

Participants felt the items measuring the ‘comfort’ and ‘ease’ variables were repetitive. As these were conceptually very similar, they were collapsed into one construct. This was done for both behaviours, forming two new variables named ‘comfort/ease ds’ and ‘comfort/ease read’. Also collapsed were the ‘spiritual connection’ and ‘emotional connection’ variables, which were also very conceptually similar, providing he new variable ‘connection’. The choice of which particular items to retain in the modified variables were based on quantitative considerations (see below).
The ‘PRI’ variable was eliminated. Despite direct observation yielding more exact results than self-report measures (Manfredo & Shelby, 1988), the majority of studies examining EPBs have used self-report measures of behaviour. The use of self-reported measures in these types of studies have been justified by EPB researchers for a range of reasons including their greater practicality (Axelrod & Lehman, 1993; Tarrant & Cordell, 1997), the fact that many environmental actions, such as voting, cannot be observed (Tarrant & Cordell, 1997), because they allow broader measures of behaviour (Axelrod & Lehman, 1993; Tarrant & Cordell, 1997), and because self-report measures allow a more comparable level of measurement to predictor factors (Axelrod & Lehman, 1993). An assumption was made for the current research that there would be similar levels of social desirability across participants as they worked in culturally homogenous environments. In addition, the aim of the study was to test the proposed B-ECO Model, rather than to document exact measurements of the behaviours and a uniform exaggeration of behavioural responses would not affect this.

The ‘LOC’ variable was included in the pilot questionnaire as one measure of ‘self-efficacy’. However, the focus of self-efficacy in the proposed B-ECO Model was whether or not an individual felt they had the skills to perform a particular behaviour, and whether or not they felt that their actions would impact on the natural environment. As these two sub-factors of ‘self-efficacy’ were included, the third and less interesting (in terms of the proposed B-ECO Model) variable of locus of control was removed for the sake of brevity.

One participant noted that she often reads documents on the screen, but subsequently prints a copy. The wording of selected items was changed to ensure that respondents understood that the questionnaire was asking about reading text on the screen instead of, not in addition to, printing to read.

The ‘knowledge items were confusing to respondents and answered in a variety of ways. Therefore, these items were not scored quantitatively for analysis. The qualitative feedback from participants was utilized to improve the format and content of ‘knowledge’ questions for the finalized questionnaire. New items were composed with input from two environmental practitioners. Two items focused on climate change, measuring general environmental knowledge. One item asked about the use of office paper, measuring specific environmental knowledge.
Finally, the order of response options in two sections were altered in response to feedback from the pilot questionnaire. In the ‘values’ section, ‘opposed’ was placed before ‘0’, which was seen as more logical than appearing after ‘7’, and the Likert scale used in the ‘attitudes’ section was reversed so that ‘strongly disagree’ appeared first, as this was also seen as more logical by participants.

4.4.2 Quantitative analysis

Statistical analysis was limited due to the small number of participants. However, some analysis was conducted to assist in the streamlining of the questionnaire. Data were analyzed using the SPSS statistical computer program.

Data were entered and frequencies checked to identify problems with data entry. Negative items were then re-coded.

Cronbach’s alphas were calculated for each variable, as well as the Cronbach’s alpha score for the variable if each item were eliminated. Appendix F contains the complete reliability results for Study 2. Alpha scores were used to guide which items to eliminate when collapsing the ‘comfort/ease’, and ‘emotional/spiritual connection to the environment’ variables. One item from each of ‘comfort read’, ‘comfort ds’, ‘ease read’ and ‘ease ds’ were removed, based on the alpha scores. The items seemed logical to remove, and did appear to eliminate some of the repetitiveness. The item ‘I feel happy when I spend time in nature’ was eliminated from the ‘emotional connection’ category as the alpha would increase from .67 to .71 if this item was eliminated, whereas it would decrease if either of the other items were eliminated. With ‘spiritual connection’, the alphas were not as useful. The overall alpha was .73, and the alphas if items were eliminated were as follows: ‘I feel that I am one with the earth’; .61, ‘I believe that the earth and my spirit are connected at a deep level’; .52, and ‘I believe that people and nature are separate entities’; .78. Although at first glance it would appear logical to eliminate ‘separate entities’, the other two items are almost identical, which may have contributed to the similarity in reliability scores. In addition, ‘separate entities’ is the only negatively worded item, with the other two being positively worded. Thus, the item with the second highest ‘alpha if item deleted’ score was chosen, that is, ‘one with earth’ was eliminated.
4.4.3 Additional considerations

Items to measure ‘activism’ were eliminated from the final questionnaire as their inclusion did not contribute to the aim of testing the proposed B-ECO Model, which was designed for non-activist behaviours.

The questionnaire was then made uniform. Numerous variables were measured by three items, others by four, and one variable was measured by two items only. As brevity was a priority, selected items were removed so that all variables were measured by three items. The first level of criteria for elimination was whether two items within the same category appeared to be repeating, and the second was based on the SPSS calculations of ‘Cronbach’s Alpha if item deleted’ (see Appendix F). An additional consideration was to ensure at least one each of positive and negative items. One ‘social norms’ item was changed from a negative item to a positive item. ‘Procedural information ds’ contained only two items, and a third was added.

Items in the ‘Attitude’ section were organised under the headings ‘Double sided printing’, ‘Reading on the screen’, and ‘Miscellaneous’, for ease of responding.

Finally, ‘value’ items and items under the ‘Attitude’ heading were randomized within their own categories to avoid order effects. A table of random numbers (Lehman, 1991) was used to determine the order or items.

The final organisation of variables and questionnaire items are presented in Appendix G. The final amended questionnaire is presented in Appendix H.

4.5 Discussion

The pilot study yielded a useful survey tool to test the proposed B-ECO Model of the predictors for the performance of EPBs. The survey tool is able to measure the performance of two behaviours and all factors (incorporating sub-factors) from the proposed B-ECO Model, with the exception of ‘procedural information for reading on the screen’, which will be necessarily possessed by all respondents as they will be answering the questionnaire electronically.
The questionnaire developed in this pilot study may be a useful tool for other researchers. Either the entire questionnaire could be used to re-test the B-ECO Model with different populations at different times for comparison of results and also for further theoretical development regarding the prediction of EPB performance. Components of the questionnaire could be used if researchers had particular interest in specific predictors of paper use. Alternatively, the questionnaire could be modified to test the proposed Model with different behaviours.

Future development of tools to test the proposed B-ECO Model may benefit from incorporating direct observation of behaviour in order to yield a more accurate measurement of behavioural performance.

There may be additional considerations specific to the two behaviours measured by the questionnaire that motivate or inhibit their expression, such as that single sided printing may be faster than double sided printing. It is impossible to capture all possible facets of every behaviour by a quantitative survey tool. Future research to test the proposed B-ECO Model may benefit from qualitative research to further examine the drivers for the performance of various behaviours.
Chapter 5

Study 3 – Testing the proposed B-ECO Model of the predictors for the performance of EPBs

5.1 Introduction and rationale

As outlined in Chapter 1, the overall goal of the current research is to investigate the precursors to the performance of EPBs. This broad goal encompassed three aims of developing a new accessible theory of EPB performance including a predictive model, testing and refining the model to ensure it is rigorous, and examining EPB performance within Australia. Study 3 addresses the last two of these aims by testing the proposed B-ECO Model already developed here with an Australian population, and refining the model based on the results of the study. Additionally, testing the proposed B-ECO Model using office paper behaviours will contribute findings regarding office paper use, an area not widely investigated, but one with potentially a large environmental impact.

5.2 Aims and hypotheses

There were three aims for Study 3:

- To test the proposed B-ECO Model.
- To modify the proposed B-ECO Model and corresponding theory based on study findings.
- To determine which factors are important in the prediction of office paper use behaviour within Australia.
There were five hypotheses for Study 3:

1. That all factors in the proposed B-ECO Model except ‘demographics’ will contribute to predicting the performance of ‘double-sided printing’ and ‘reading on the screen’.
2. That at least some of the variables specific to only one of the two behaviours being tested will predict both behaviours, as per the proposed existence of clusters of EPBs.
3. That ‘values’, ‘environmental knowledge’, and ‘connection to the environment’ will be mediated by ‘general attitudes’ and ‘specific attitudes’ when predicting ‘double-sided printing’ and ‘reading on the screen’, as per the proposed B-ECO Model.
4. That the ‘value’ dimensions ‘self-transcendence’ and ‘openness’ will be positive predictors of both behaviours, and that ‘self-enhancement’ and ‘tradition’ will be negative predictors.
5. That ‘convenience’, ‘social norms’ and ‘procedural information’ will be the most influential direct factors in the performance of ‘double-sided printing’ and ‘reading on the screen’, as per the proposed B-ECO Model.

5.3 Methodology

5.3.1 Participants

Participants comprised 503 office-based staff members of four Victorian Government Departments. All workplaces were located in the central business district of Melbourne, and all employed an Environmental Officer to promote environmentally preferred practices in the workplace.

Table 5.1 contains a breakdown of the demographic profile of participants.
<table>
<thead>
<tr>
<th>Category</th>
<th>Number of participants</th>
<th>Percentage of all participants</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>208</td>
<td>41%</td>
</tr>
<tr>
<td>Female</td>
<td>287</td>
<td>57%</td>
</tr>
<tr>
<td>Missing data</td>
<td>8</td>
<td>2%</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-25</td>
<td>45</td>
<td>9%</td>
</tr>
<tr>
<td>26-29</td>
<td>73</td>
<td>15%</td>
</tr>
<tr>
<td>30-39</td>
<td>124</td>
<td>24%</td>
</tr>
<tr>
<td>40-49</td>
<td>128</td>
<td>25%</td>
</tr>
<tr>
<td>50-59</td>
<td>111</td>
<td>22%</td>
</tr>
<tr>
<td>Over 60</td>
<td>14</td>
<td>3%</td>
</tr>
<tr>
<td>Missing data</td>
<td>8</td>
<td>2%</td>
</tr>
<tr>
<td><strong>Level of education</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Secondary</td>
<td>70</td>
<td>14%</td>
</tr>
<tr>
<td>Tertiary</td>
<td>425</td>
<td>84%</td>
</tr>
<tr>
<td>Missing data</td>
<td>8</td>
<td>2%</td>
</tr>
<tr>
<td><strong>Political leanings</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>More left wing</td>
<td>254</td>
<td>50%</td>
</tr>
<tr>
<td>More right wing</td>
<td>38</td>
<td>8%</td>
</tr>
<tr>
<td>Neither left nor right leaning</td>
<td>133</td>
<td>26%</td>
</tr>
<tr>
<td>Don’t care about politics</td>
<td>64</td>
<td>13%</td>
</tr>
<tr>
<td>Missing data</td>
<td>14</td>
<td>3%</td>
</tr>
<tr>
<td><strong>Income (in thousands)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; $40</td>
<td>34</td>
<td>7%</td>
</tr>
<tr>
<td>$41-50</td>
<td>83</td>
<td>17%</td>
</tr>
<tr>
<td>$51-60</td>
<td>118</td>
<td>23%</td>
</tr>
<tr>
<td>$61-70</td>
<td>103</td>
<td>21%</td>
</tr>
<tr>
<td>$71-80</td>
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<td>$81-90</td>
<td>32</td>
<td>6%</td>
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<tr>
<td>&gt; $90</td>
<td>39</td>
<td>8%</td>
</tr>
<tr>
<td>Missing data</td>
<td>17</td>
<td>3%</td>
</tr>
</tbody>
</table>

As can be seen from Table 5.1, there were slightly more female participants than males. Most participants were aged between 30-49, and the vast majority had achieved a tertiary education. Most participants were left-leaning politically, but many reported that they were neither left nor right leaning. Very few reported being right-leaning or not caring about politics. Most participants earned between $51,000 to $70,000, making this an average paid sample.
5.3.2 Sampling methodology

i) Organisation selection
Staff who worked in office environments were targeted for the current study as they frequently print and read electronic documents. In addition, central business district-based workplaces were targeted as there is a high rate of office employment in these types of locations.

Convenience sampling was used to select organisations to participate, beginning with a professional contact of the researcher at one Government Department who had expressed an interest in participating in the research. Other office-based Government Departments were then targeted, rather than office-based business organisations, in order to maximize homogeneity. Environmental Officers at the 12 Government Departments that exist in Melbourne were approached and invited to participate in the study. Four organisations agreed to participate.

ii) Participant selection
Participants were self-selected, choosing to complete the on-line questionnaire after receiving an electronic invitation from the Environment Officer at their workplace. Two Departments invited participation via an e-mail sent to all staff, and two posted the invitation on their workplace intranets. Invitations were composed internally by the Environment Officers, but were based on the template provided by the researcher which appears in Appendix I. The questionnaire was available to participants for a period of two weeks during 2007.

5.3.3 Materials

After receiving their electronic invitation to participate in the study, staff could choose to click on a link contained in the invitation which led them to an Explanatory Statement (see Appendix J). A link to an on-line questionnaire (see Appendix H) appeared at the bottom of the Explanatory Statement. Participants then clicked on this link to access the questionnaire, which they completed electronically and at their convenience. Consent was implied by the act of voluntarily completing the questionnaire.
Once questionnaires were completed, the data were automatically sent to an electronic data-base. At the end of the two week questionnaire availability period, the data were saved from the electronic data-base into the SPSS statistical program.

5.3.4 Data analysis

All data analyses were conducted using the statistical computer program SPSS, Version 15.

The data were cleaned and organized via the following steps:

1. The total number of data points in the questionnaire for each participant was 116. Eighteen participants, who each had 25 or more (up to 70) data points missing, were eliminated from the data set, leaving 485 participants in the final data set. All remaining participants had 19 or less data points missing, which represents 16% or less of missing data points.

2. Inspection of the data revealed two patterns in the remaining missing data, both in the ‘knowledge’ section. There were three ‘knowledge’ items, each with five response options; four possible answers and one ‘don’t know’ option. Participants were required to click on ‘yes’ or ‘no’ for each of the five response options.

The first pattern of missing data was that the ‘don’t know’ response options for the three ‘knowledge’ items all contained a large amount of missing data. This may have been due to confusion about how to respond to these items. It is likely that many participants selected ‘yes’ or ‘no’ for the four possible answer options and then felt they had completed the item and thus left the ‘don’t know’ option blank. The answers to the ‘don’t know’ items were subsequently eliminated from data analysis. It was deemed that eliminating them would not impact significantly on the data analysis, because knowledge levels could reasonably be determined by participants’ responses to the remaining four multiple-choice response options for these items.

Secondly, there were more missing values in the responses for ‘knowledge’ items than for other sections of the questionnaire. Again, this may have been due to confusion about how to respond to the ‘knowledge’ items, or it may
have been due to confusion about the correct answers (indecisiveness). No action was taken for this problem, except that it was considered when interpreting results.

3. The following values were re-coded:

   i. For items in the ‘Values’ section of the questionnaire, answering ‘opposed’ had been coded as 55. This was re-coded as -1.
   
   ii. All responses to negatively worded items in the ‘Attitudes’ section of the questionnaire were re-coded in order to reverse them, as follows: 5 was re-coded as 1, 4 was re-coded as 2, 2 was re-coded as 4 and 1 was re-coded as 5. Values of 3 were not re-coded.

4. A Missing Value Analysis was conducted using an expectation-maximisation algorithm via the ‘EM’ function in SPSS. This function ‘…estimates the means, the covariance matrix, and the correlation of quantitative variables with missing values, using an iterative process’ (SPSS Version 15 help manual, 2006). The ‘EM’ function generated replacements for missing values, which were then inserted into the data set. Means were used as they are the ‘best guess’, and ‘…the mean for the distribution as a whole does not change and the researcher is not required to guess at missing values’ (Tabachnick & Fidell, 1996, p. 63).

5. Reliability analysis was conducted for each predetermined variable in the ‘Attitudes’ and ‘Values’ sections. Appendix K contains a complete list of reliability scores for all items used to measure the ‘Attitudes’ variables, and the subsequent reasoning for the final choice of items included to analyse each variable in this section. The only changes made were that ‘comfort/ease ds’ was divided into two separate variables, being ‘ease of double-sided printing’ and ‘comfort of double sided printing’, and ‘comfort/ease read’ had one item removed. One item was accidentally omitted from the electronic questionnaire in the ‘attitudes specific read’ variable, resulting in this sub-factor being measured with two items rather than three. Tables 5.2, 5.3 and 5.4 list the final inventory of variables which were generated and their relevant reliability statistics, as well as the factor from the proposed B-ECO Model under which the variable appears.
Table 5.2  
*Cronbach’s Alpha scores for variables specific to double-sided printing*

<table>
<thead>
<tr>
<th>Factor from the proposed B-ECO Model under which the variable appears</th>
<th>Description of variable</th>
<th>Variable name</th>
<th>Cronbach’s Alpha for variable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Convenience</td>
<td>Ease of double-sided printing</td>
<td>Ease ds</td>
<td>.69</td>
</tr>
<tr>
<td>Convenience</td>
<td>Comfort of double-sided printing</td>
<td>Comfort ds</td>
<td>One item only.</td>
</tr>
<tr>
<td>Convenience</td>
<td>Infrastructure double-sided printing</td>
<td>Infrastructure ds</td>
<td>.66</td>
</tr>
<tr>
<td>Leadership</td>
<td>Business leadership specific to double-sided printing</td>
<td>Leadership specific ds</td>
<td>.77</td>
</tr>
<tr>
<td>Social norms</td>
<td>Social norms relating to double-sided printing</td>
<td>Social norms ds</td>
<td>.67</td>
</tr>
<tr>
<td>Procedural information</td>
<td>Possessing the procedural knowledge to print double-sided</td>
<td>Procedural information ds</td>
<td>.86</td>
</tr>
<tr>
<td>Self-efficacy</td>
<td>Possessing self-efficacy in relation to double-sided printing</td>
<td>Self-efficacy ds</td>
<td>.77</td>
</tr>
<tr>
<td>Habit</td>
<td>Habit of double-sided printing</td>
<td>Habit ds</td>
<td>.88</td>
</tr>
<tr>
<td>Attitudes</td>
<td>Attitudes specific to double-sided printing</td>
<td>Attitudes specific ds</td>
<td>.74</td>
</tr>
</tbody>
</table>

Table 5.3  
*Cronbach’s Alpha scores for variables specific to reading on the screen*

<table>
<thead>
<tr>
<th>Factor from the proposed B-ECO Model under which the variable appears</th>
<th>Description of variable</th>
<th>Variable name</th>
<th>Cronbach’s Alpha for variable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Convenience</td>
<td>Ease and comfort of reading on the screen</td>
<td>Comfort/ease read</td>
<td>.67</td>
</tr>
<tr>
<td>Leadership</td>
<td>Business leadership specific to reading on the screen</td>
<td>Leadership specific read</td>
<td>.68</td>
</tr>
<tr>
<td>Social norms</td>
<td>Social norms at work relating to reading on the screen</td>
<td>Social norms read</td>
<td>.68</td>
</tr>
<tr>
<td>Self-efficacy</td>
<td>Possessing self-efficacy in relation to reading on the screen</td>
<td>Self-efficacy read</td>
<td>.81</td>
</tr>
<tr>
<td>Habit</td>
<td>Habit of reading on the screen</td>
<td>Habit read</td>
<td>.82</td>
</tr>
<tr>
<td>Attitudes</td>
<td>Attitudes specific to reading on the screen</td>
<td>Attitudes specific read</td>
<td>.59</td>
</tr>
</tbody>
</table>
Table 5.4
Cronbach’s Alpha scores for variables applicable to both behaviours

<table>
<thead>
<tr>
<th>Factor from the proposed B-ECO Model under which the variable appears</th>
<th>Description of variable</th>
<th>Variable name</th>
<th>Cronbach’s Alpha for variable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leadership</td>
<td>Business leadership relating to the environment in general</td>
<td>Leadership general</td>
<td>.83</td>
</tr>
<tr>
<td>Nature experience</td>
<td>Nature experience</td>
<td>Nature experience</td>
<td>.77</td>
</tr>
<tr>
<td>Self-efficacy</td>
<td>Possessing a general sense of self-efficacy in relation to the environment</td>
<td>Self-efficacy general</td>
<td>.72</td>
</tr>
<tr>
<td>Attitudes</td>
<td>Attitudes about the environment in general</td>
<td>Attitudes general</td>
<td>.65</td>
</tr>
<tr>
<td>Knowledge about the environment</td>
<td>Knowledge about the environment in general</td>
<td>Knowledge</td>
<td>Was a score depending on number of correct responses.</td>
</tr>
<tr>
<td>Emotional/spiritual connection to the environment</td>
<td>Emotional/spiritual connection to the environment</td>
<td>Connected</td>
<td>.60</td>
</tr>
<tr>
<td>Values</td>
<td>Holding the value of self-transcendence</td>
<td>Self-transcendence</td>
<td>.80</td>
</tr>
<tr>
<td>Values</td>
<td>Holding the value of self-enhancement</td>
<td>Self-enhancement</td>
<td>.85</td>
</tr>
<tr>
<td>Values</td>
<td>Holding the value of being open to change</td>
<td>Openness</td>
<td>.82</td>
</tr>
<tr>
<td>Values</td>
<td>Holding the value of being traditional</td>
<td>Traditional</td>
<td>.87</td>
</tr>
<tr>
<td>Demographics</td>
<td>Gender</td>
<td>Gender</td>
<td>One item only.</td>
</tr>
<tr>
<td>Demographics</td>
<td>Age</td>
<td>Age</td>
<td>One item only.</td>
</tr>
<tr>
<td>Demographics</td>
<td>Level of education</td>
<td>Education</td>
<td>One item only.</td>
</tr>
<tr>
<td>Demographics</td>
<td>Political persuasion</td>
<td>Political</td>
<td>One item only.</td>
</tr>
<tr>
<td>Demographics</td>
<td>Income</td>
<td>Income</td>
<td>One item only.</td>
</tr>
</tbody>
</table>
6. The 'compute' function in SPSS was used to generate values for each variable, rather than for each item, for variables which comprised more than one item. This function provided a mean for the items comprising each variable for each participant.

7. Dummy variables were created for 'age' and 'political' so these variables could be analysed.

8. Multicollinearity was tested by computing correlations between all variables except 'political', which consisted of nominal data. Field suggests that correlations above .80 indicate problems with multicollinearity. The highest correlation in the current data set was .68, and thus multicollinearity was deemed to not be a problem. For a table of all correlations, please see Appendix L.

9. No outliers were detected using eyeballing.

The data were then analysed in the following ways:

1. Frequencies for each variable were computed in order to obtain information on respondents views, and to gauge whether respondents could be differentiated on each variable.

2. Correlations were computed between each variable and each behaviour to indicate the relationships between variables and behaviours.

3. A number of regressions were then carried out to test the proposed B-ECO Model, as follows:
   i. Baron and Kenny's (1986) mediated regression technique was used to examine the effect on behaviour of attitudes ('attitudes specific ds', 'attitudes specific read', and 'attitudes general') and the three factors proposed to affect behaviour indirectly via 'attitudes'. This technique allows analysis of indirect relationships such as those proposed in the Model. Mediated regressions were conducted separately for each behaviour.
   ii. Stepwise regressions were conducted on the two factor sets proposed to affect behaviour directly to examine the relative predictive power of these
factors on behaviour. Stepwise regressions were conducted separately for each behaviour.

All relevant factors from the proposed B-ECO Model were used to test ‘double-sided printing’, and all relevant factors from the proposed B-ECO Model excluding ‘procedural information’ were used to test ‘reading on the screen’.

5.4 Results

5.4.1 Frequencies

Frequencies were computed for each variable. Bar charts representing these frequencies are presented below.

Figure 5.1. Frequency of performance of behaviours

Figure 5.1. Almost all participants reported participating in both behaviours at least sometimes, with most reporting that they perform them often, and many reporting that they always perform these behaviours. More participants reported always ‘double-sided printing’ than always ‘reading on the screen’, but more reported often ‘reading on the screen’ than often ‘double-sided printing’.

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Figure 5.2. Participants found it more convenient to perform ‘double-sided printing’ than to perform ‘reading on the screen’. ‘Double-sided printing’ was seen as very convenient, whereas there was a larger spread of results for ‘reading on the screen’. For most, the appropriate infrastructure was always available, but for a sizable group it was available for only a proportion of printing events.
Figure 5.3. An even spread of social norms was reported by participants, with the majority reporting 'sometimes' feeling social pressure (a score of 3).
**Figure 5.4.** Perceived levels of business leadership

![Bar chart showing perceived levels of business leadership](image)

Business leadership in this area was neither perceived to be particularly strong nor particularly weak.

**Figure 5.5.** Reported levels of nature experience

![Bar chart showing reported levels of nature experience](image)

Very high levels of nature experience were reported by participants.
Figure 5.6. Reported levels of valuing self-transcendence/self-enhancement

Most participants gained high scores for ‘self-transcendence’ and medium/low scores for ‘self-enhancement’. Previous research has indicated that ‘self-transcendence’ and ‘self-enhancement’ are opposed (eg. Schwartz, 1994). These results may therefore indicate that, overall, the participants in the current study valued ‘self-transcendence’ more highly than they did ‘self-enhancement’.
Figure 5.7. Reported levels of valuing openness/tradition

Figure 5.7. Most participants gained medium scores for ‘traditional’ and medium/high scores for ‘openness’. Previous research has indicated that ‘openness’ and ‘traditional’ are opposed (eg. Schwartz, 1994). These results may therefore indicate that, overall, the participants in the current study valued ‘openness’ more highly than they did being ‘traditional’.
Figure 5.8. Level of environmental knowledge

![Bar chart showing the level of environmental knowledge with 'Knowledge score' on the y-axis and 'Number of respondents' on the x-axis.]

'Knowledge' was quite high.
Figure 5.9. Reported levels of emotional/spiritual connection to nature

Figure 5.9. A very high feeling of connection with nature was reported by participants.
Figure 5.10. Participants held very positive ‘attitudes’ toward protecting the environment. These were strongest for ‘attitudes specific ds’ and for ‘attitudes general’, and were slightly weaker for ‘attitudes specific read’. A negligible number of participants reported holding negative ‘attitudes’ toward the environment.
**Figure 5.11.** Reported levels of knowledge of procedural information

![Bar chart showing levels of knowledge of procedural information.]

**Figure 5.11.** Participants reported possessing very high levels of ‘procedural information’ regarding how to print double-sided.
Figure 5.12. Participants possessed very high levels of ‘self-efficacy’ relating to beliefs that their performance of measured behaviours could impact on the natural environment, and that their actions in general could impact on the natural environment.
Figure 5.13. Reported frequency of habit

Figure 5.13. Most participants reported habitually performing both behaviours, with more participants always double-siding their printing, but more participants sometimes or often reading on the screen.

5.4.2 Correlations

Correlations were calculated between each behaviour and all variables relevant to that behaviour, that is, to those variables specific to that behaviour, as well as to general variables. Each behaviour was also correlated with variables specific to the other behaviour in the study. Correlations were not computed for the sub-factor ‘political’, as this comprised nominal data. Results are presented in Tables 5.5 – 5.8.
Table 5.5
Correlations between ‘double-sided printing’ and variables relevant to ‘double-sided printing’

<table>
<thead>
<tr>
<th>Factor name</th>
<th>Variable name</th>
<th>Pearson’s r</th>
</tr>
</thead>
<tbody>
<tr>
<td>Habit</td>
<td>Habit ds</td>
<td>0.78**</td>
</tr>
<tr>
<td>Convenience</td>
<td>Infrastructure ds</td>
<td>0.56**</td>
</tr>
<tr>
<td>Procedural information</td>
<td>Procedural information ds</td>
<td>0.56**</td>
</tr>
<tr>
<td>Convenience</td>
<td>Ease ds</td>
<td>0.51**</td>
</tr>
<tr>
<td>Social norms</td>
<td>Social norms ds</td>
<td>0.43**</td>
</tr>
<tr>
<td>Attitudes</td>
<td>Attitudes specific ds</td>
<td>0.41**</td>
</tr>
<tr>
<td>Leadership</td>
<td>Leadership ds</td>
<td>0.35**</td>
</tr>
<tr>
<td>Convenience</td>
<td>Comfort ds</td>
<td>0.30**</td>
</tr>
<tr>
<td>Attitudes</td>
<td>Attitudes general</td>
<td>0.26**</td>
</tr>
<tr>
<td>Self-efficacy</td>
<td>Self-efficacy ds</td>
<td>0.25**</td>
</tr>
<tr>
<td>Self-efficacy</td>
<td>Self-efficacy general</td>
<td>0.25**</td>
</tr>
<tr>
<td>Leadership</td>
<td>Leadership general</td>
<td>0.24**</td>
</tr>
<tr>
<td>Connection to the environment</td>
<td>Connected</td>
<td>0.23**</td>
</tr>
<tr>
<td>Environmental knowledge</td>
<td>Knowledge</td>
<td>0.19**</td>
</tr>
<tr>
<td>Nature experience</td>
<td>Nature experience</td>
<td>0.16**</td>
</tr>
<tr>
<td>Values</td>
<td>Self-transcendence</td>
<td>0.12*</td>
</tr>
<tr>
<td>Demographics</td>
<td>Age</td>
<td>-0.11*</td>
</tr>
<tr>
<td>Values</td>
<td>Traditional</td>
<td>-0.90*</td>
</tr>
<tr>
<td>Demographics</td>
<td>Openness</td>
<td>0.04</td>
</tr>
<tr>
<td>Values</td>
<td>Income</td>
<td>0.03</td>
</tr>
<tr>
<td>Demographics</td>
<td>Gender</td>
<td>0.03</td>
</tr>
<tr>
<td>Values</td>
<td>Self-enhancement</td>
<td>-0.02</td>
</tr>
</tbody>
</table>

*p<.05, **p<.01

It can be seen in Table 5.5 that very high significant correlations were computed for ‘double-sided printing’ and the sub-factors of ‘habit ds’, ‘infrastructure ds’, ‘procedural information ds’, ‘ease ds’, ‘social norms ds’ and ‘attitudes specific ds’. Also highly and significantly correlated were ‘leadership ds’, ‘more comfortable ds’, ‘attitudes general’, ‘self-efficacy ds’, ‘self-efficacy general’, ‘leadership general’, ‘connected’ and ‘knowledge’. Still significantly correlated, but not as highly were ‘nature experience’, ‘self-transcendence’, ‘age’ (negatively), ‘education’ and ‘traditional’ (negatively). Factors which did not significantly correlate with double-sided printing were ‘openness’, ‘income’, ‘gender’ and ‘self-enhancement’.
Correlations between double-sided printing behaviour and variables specific to reading on the screen behaviour

<table>
<thead>
<tr>
<th>Factor name</th>
<th>Variable name</th>
<th>Pearson's r</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attitudes</td>
<td>Attitudes specific read</td>
<td>0.23**</td>
</tr>
<tr>
<td>Self-efficacy</td>
<td>Self-efficacy read</td>
<td>0.23**</td>
</tr>
<tr>
<td>Social norms</td>
<td>Social norms read</td>
<td>0.18**</td>
</tr>
<tr>
<td>Leadership</td>
<td>Leadership read</td>
<td>0.08</td>
</tr>
<tr>
<td>Habit</td>
<td>Habit read</td>
<td>0.08</td>
</tr>
<tr>
<td>Convenience</td>
<td>Comfort/ease read</td>
<td>0.01</td>
</tr>
</tbody>
</table>

*p<.05, **p<.01

Table 5.6 reveals that a number of variables specific to reading on the screen correlated significantly with double-sided printing, although correlations were not very high.
Table 5.7

Correlations between reading on the screen behaviour and variables relevant to reading on the screen behaviour

<table>
<thead>
<tr>
<th>Factor name</th>
<th>Variable name</th>
<th>Pearson’s r</th>
</tr>
</thead>
<tbody>
<tr>
<td>Habit</td>
<td>Habit read</td>
<td>0.69**</td>
</tr>
<tr>
<td>Convenience</td>
<td>Comfort/ease read</td>
<td>0.50**</td>
</tr>
<tr>
<td>Attitudes</td>
<td>Attitudes specific read</td>
<td>0.44**</td>
</tr>
<tr>
<td>Self-efficacy</td>
<td>Self-efficacy read</td>
<td>0.28**</td>
</tr>
<tr>
<td>Attitudes</td>
<td>Attitudes general</td>
<td>0.21**</td>
</tr>
<tr>
<td>Social norms</td>
<td>Social norms read</td>
<td>0.20**</td>
</tr>
<tr>
<td>Self-efficacy</td>
<td>Self-efficacy general</td>
<td>0.19**</td>
</tr>
<tr>
<td>Connection to the</td>
<td>Connected</td>
<td>0.18**</td>
</tr>
<tr>
<td>environment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environmental knowledge</td>
<td>Knowledge</td>
<td>0.17**</td>
</tr>
<tr>
<td>Nature experience</td>
<td>Nature experience</td>
<td>0.17*</td>
</tr>
<tr>
<td>Leadership</td>
<td>Leadership read</td>
<td>0.12*</td>
</tr>
<tr>
<td>Demographics</td>
<td>Income</td>
<td>-0.11*</td>
</tr>
<tr>
<td>Values</td>
<td>Openness</td>
<td>0.10*</td>
</tr>
<tr>
<td>Values</td>
<td>Self-transcendence</td>
<td>0.09*</td>
</tr>
<tr>
<td>Values</td>
<td>Self-enhancement</td>
<td>-0.07</td>
</tr>
<tr>
<td>Demographics</td>
<td>Age</td>
<td>-0.07</td>
</tr>
<tr>
<td>Values</td>
<td>Traditional</td>
<td>-0.05</td>
</tr>
<tr>
<td>Leadership</td>
<td>Leadership general</td>
<td>0.01</td>
</tr>
<tr>
<td>Demographics</td>
<td>Education</td>
<td>-0.01</td>
</tr>
<tr>
<td>Demographics</td>
<td>Gender</td>
<td>0.00</td>
</tr>
</tbody>
</table>

*p<.05, **p<.01

It can be seen in Table 5.7 that very high significant correlations were computed for ‘reading on the screen’ with the variables of ‘habit read’, ‘comfort/ease read’ and ‘attitudes specific read’. Also highly and significantly correlated were ‘self-efficacy read’, ‘attitudes general’, ‘social norms read’, ‘self-efficacy general’, ‘connected’ and ‘knowledge’. Still significantly correlated, but not as highly were ‘nature experience’, ‘leadership read’, ‘openness’, ‘self-transcendence’, and ‘income’ (negatively). Variables which did not significantly correlate with ‘reading on the screen’ were ‘leadership general’, ‘gender’, ‘education', ‘traditional', ‘self-enhancement’ and ‘age’.
Table 5.8

Correlations between ‘reading on the screen’ and variables specific to ‘double-sided printing’

<table>
<thead>
<tr>
<th>Factor name</th>
<th>Variable name</th>
<th>Pearson's r</th>
</tr>
</thead>
<tbody>
<tr>
<td>Habit</td>
<td>Habit ds</td>
<td>0.20**</td>
</tr>
<tr>
<td>Convenience</td>
<td>Comfort ds</td>
<td>0.13**</td>
</tr>
<tr>
<td>Convenience</td>
<td>Ease ds</td>
<td>0.13**</td>
</tr>
<tr>
<td>Attitudes</td>
<td>Attitudes specific ds</td>
<td>0.13**</td>
</tr>
<tr>
<td>Self-efficacy</td>
<td>Self-efficacy ds</td>
<td>0.12**</td>
</tr>
<tr>
<td>Procedural information</td>
<td>Procedural information ds</td>
<td>0.09*</td>
</tr>
<tr>
<td>Convenience</td>
<td>Infrastructure</td>
<td>0.08</td>
</tr>
<tr>
<td>Leadership</td>
<td>Leadership ds</td>
<td>0.08</td>
</tr>
<tr>
<td>Social norms</td>
<td>Social norms ds</td>
<td>0.06</td>
</tr>
</tbody>
</table>

*p<.05, **p<.01

Table 5.8 reveals that a number of variables specific to ‘double-sided printing’ correlated significantly with ‘reading on the screen’, although correlations were not very strong.

5.4.3 Regressions

5.4.3.1 Testing for mediation

It was hypothesized that ‘attitudes’ would mediate the relationship between ‘values’, ‘knowledge’ and ‘connected’, and behaviour. Therefore, this was tested via a series of mediated regressions.

‘Values’ comprised four variables, being ‘self-transcendence’, ‘self-enhancement’, ‘openness’ and ‘tradition’, while ‘knowledge’ and ‘connected’ were single variables. The two hypothesized mediating variables of ‘attitudes specific’ and ‘attitudes general’ were tested against the relationships between the six independent variables of ‘self-transcendence’, ‘self-enhancement’, ‘openness’, ‘tradition’, ‘knowledge’ and ‘connected’ and the two behaviours under examination. Thus, 24 sets of regressions were performed.
Baron and Kenny (1986) indicate that mediation is suggested when the following conditions are met:

- If the independent variable significantly predicts the mediator,
- If the independent variable significantly predicts the dependent variable (this step is not necessarily vital),
- If the mediator significantly predicts the dependent variable when the independent variable is controlled, and
- If the effect of the independent variable on the dependent variable is less when the mediator is controlled than when the mediator is not included in the analysis.

Perfect mediation holds if the independent variable does not affect the dependent variable at all when the mediator is controlled, that is, the effect size is zero. If it is not zero, this may be because there are multiple mediating factors, which is highly likely in the area of social psychology. Therefore, when using social science data, mediation can be reasonably suggested if the mediator decreases the effect of the independent variable on the dependent variable, rather than eliminating it. Baron and Kenny (1986) also note that this decrease does suggest an effect of the mediator on the relationship, but not necessarily one that is necessary or sufficient for the effect to be present.

Baron and Kenny (1986) caution that it is important to note that two types of errors may also be causing the effects which suggest mediation, being that there may be measurement error in the mediator, and that the dependent variable may be causing the mediator. Further, they suggest that the mediator is often measured with measurement error when it is an internal, psychological variable.

Kenny (2006) notes that the significance level should not be the only consideration when deciding if the effect is important, as trivially small effect sizes can be significant with large response numbers and vice versa.
Thus, using the technique described by Baron and Kenny (1986), a series of three forced entry regressions were performed for each relationship as follows:

Regression 1: The hypothesized mediator was regressed on the independent variable.
Regression 2: The dependent variable was regressed on the independent variable.
Regression 3: The dependent variable was regressed on both the independent variable and on the hypothesized mediator.

According to Baron and Kenny (1986) mediation is occurring if the following steps hold:

Step 1: The independent variable must significantly predict the mediator in Regression 1.
Step 2: The independent variable must significantly predict the dependent variable in Regression 2.
Step 3: The mediator must affect the dependent variable in Regression 3.
Step 4: The effect of the independent variable on the dependent variable must be less in the Regression 3 (when the mediator is controlled) than in Regression 2 (when the mediator is not included in the equation).

$R^2$ was used to determine the effect of the independent variable on the mediator and the effect of the independent variable on the dependent variable. Standardized beta scores were used to determine the effect of the mediator on the dependent variable when the independent variable was held constant as the effect of this one variable was required, rather than the score when both variables were tested. Standardized betas were also used to compare the effect of the independent variable on the dependent variable when the mediator was controlled compared to when it was absent from analysis. This is because the predictive power of the independent variable combined with the mediator (as happens with the ‘enter’ method of regression) would always be stronger than for the independent variable alone. Therefore, the standardized betas are a more useful comparative figure as they apply to each variable alone.

The relevant elements of the results to determine mediation are presented in Tables 5.9 and 5.10 below.
### Table 5.9
Relevant results from mediated regression equations for double-sided printing

<table>
<thead>
<tr>
<th>Mediation being tested (independent variable – mediator – dependent variable)</th>
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<th>Step 2 $R^2$ for equation 2</th>
<th>Step 3 $\beta$ for the mediator in equation 3 (shd this be $R^2$)</th>
<th>Step 4 $\beta$ for the independent variable in equation 3</th>
<th>$\beta$ for the independent variable in equation 2</th>
<th>Do conditions for mediation exist?</th>
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<tbody>
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</tr>
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<td>.00</td>
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<td>.01*</td>
<td>.18***</td>
<td>.41***</td>
<td>-.09*</td>
<td>-.10*</td>
</tr>
<tr>
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<td>.04***</td>
<td>.19***</td>
<td>.39***</td>
<td>.19***</td>
<td>.15***</td>
</tr>
<tr>
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<td>.05***</td>
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<td>.23***</td>
<td>.12**</td>
</tr>
<tr>
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<td>.01*</td>
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<td>-.01</td>
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<td>.15***</td>
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*p<.05, **p<.01, ***p<.001
Table 5.10

Relevant results from mediated regression equations for reading on the screen

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<th>Mediation being tested (independent variable – mediator – dependent variable)</th>
<th>Step 1 (R^2) for equation 1</th>
<th>[Step 2 (R^2) for equation 2]</th>
<th>(R^2) for equation 3</th>
<th>Step 3 (\beta) for the mediator in equation 3 (shd this be (R^2))</th>
<th>Step 4 (\beta) for the independent variable in equation 3</th>
<th>(\beta) for the independent variable in equation 2</th>
<th>Do conditions for mediation exist?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-transcendence – attitudes specific read – read</td>
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<td>.01*</td>
<td>.20***</td>
<td>.46***</td>
<td>.09*</td>
<td>-.06</td>
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</tr>
<tr>
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<td>.00</td>
<td>.20***</td>
<td>.44***</td>
<td>-.07</td>
<td>-.05</td>
<td>No</td>
</tr>
<tr>
<td>Openness – attitudes specific read – read</td>
<td>.03***</td>
<td>.01*</td>
<td>.20***</td>
<td>.44***</td>
<td>.10*</td>
<td>.02</td>
<td>Yes</td>
</tr>
<tr>
<td>Tradition – attitudes specific read – read</td>
<td>.00</td>
<td>.00</td>
<td>.20***</td>
<td>.44***</td>
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<td>-.06</td>
<td>No</td>
</tr>
<tr>
<td>Knowledge – attitudes specific read – read</td>
<td>.02**</td>
<td>.03***</td>
<td>.21***</td>
<td>.43***</td>
<td>.17***</td>
<td>.12**</td>
<td>Yes</td>
</tr>
<tr>
<td>Connected – attitudes specific read – read</td>
<td>.12***</td>
<td>.03***</td>
<td>.20***</td>
<td>.43***</td>
<td>.18***</td>
<td>.03</td>
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</tr>
<tr>
<td>Self-transcendence – attitudes general – read</td>
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<td>.01*</td>
<td>.05***</td>
<td>.21***</td>
<td>.09*</td>
<td>.02</td>
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<tr>
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<td>.00</td>
<td>.05***</td>
<td>.21***</td>
<td>-.07</td>
<td>-.05</td>
<td>No</td>
</tr>
<tr>
<td>Openness – attitudes general – read</td>
<td>.03***</td>
<td>.01*</td>
<td>.05***</td>
<td>.20***</td>
<td>.10*</td>
<td>.06</td>
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</tr>
<tr>
<td>Tradition – attitudes general – read</td>
<td>.02**</td>
<td>.00</td>
<td>.05***</td>
<td>.21***</td>
<td>-.05</td>
<td>-.02</td>
<td>No</td>
</tr>
<tr>
<td>Knowledge – attitudes general – read</td>
<td>.03***</td>
<td>.03***</td>
<td>.06***</td>
<td>.19***</td>
<td>.17***</td>
<td>.13**</td>
<td>Yes</td>
</tr>
<tr>
<td>Connected – attitudes general – read</td>
<td>.26***</td>
<td>.03***</td>
<td>.05***</td>
<td>.17**</td>
<td>.18***</td>
<td>.09</td>
<td>Yes</td>
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</table>

*p<.05, **p<.01, ***p<.001
As can be seen in Tables 5.9 and 5.10 above, both ‘attitudes specific’ and ‘attitudes general’ were clearly found to mediate between ‘knowledge’ and both behaviours, and between ‘connected’ and both behaviours.

The relationships involving ‘values’ are more complex. No mediating effects were found for ‘attitudes specific’ or ‘attitudes general’ on ‘self-enhancement’ or ‘tradition’, except for ‘attitudes general’ mediating between ‘tradition’ and ‘double-sided printing’, which was a negative relationship. ‘Attitudes specific’ mediated the relationship between ‘self-transcendence’ and both behaviours (negative relationships), and ‘general attitudes’ were found to mediate between ‘self-transcendence’ and both behaviours. ‘Attitudes specific’ and ‘attitudes general’ were both found to mediate between ‘openness’ and ‘reading on the screen’, but not for ‘double-sided printing’.

These results are diagrammatically represented in Figures 5.14 - 5.17 below.

**Figure 5.14.** Mediated relationships for ‘attitudes specific’ and ‘double-sided printing’

![Diagram](image)

*Figure 5.14. ‘Knowledge’, ‘connected’ and ‘self-transcendence’ are mediated by ‘attitudes specific’ to produce the performance of ‘double-sided printing’.*
**Figure 5.15.** Mediated relationships for ‘attitudes general’ and ‘double-sided printing’

Knowledge

Connection to the environment

Self-transcendence

 Tradition (negative relationship)

General attitudes \[\rightarrow\] Double-sided printing

*Figure 5.15.* All proposed factors are mediated by ‘attitudes general’ to produce the performance of ‘double-sided printing’.

**Figure 5.16.** Mediated relationships for ‘attitudes specific’ and ‘reading on the screen’

Knowledge

Connection to the environment

Self-transcendence (negative relationship)

Openness

Specific attitudes \[\rightarrow\] Reading on the screen

*Figure 5.16.* All proposed factors are mediated by ‘attitudes specific’ to produce the performance of ‘reading on the screen’.
Figure 5.17. Mediated relationships for ‘attitudes general’ and ‘reading on the screen’

![Diagram showing mediated relationships between factors]

Figure 5.17. All proposed factors are mediated by ‘attitudes general’ to produce the performance of ‘reading on the screen’.

5.4.3.2 Testing direct relationships

i) Double-sided printing
A stepwise regression was performed which tested all variables relevant to ‘double-sided printing’ except those included in the mediated regressions, that is, 8 variables specific to ‘double-sided printing’ (‘ease ds’, ‘infrastructure ds’, ‘comfort ds’, ‘leadership specific ds’, ‘social norms ds’, ‘procedural information ds’, ‘self-efficacy ds’, ‘habit ds’), and 10 variables relevant to both behaviours (‘leadership general’, ‘nature experience’, ‘self-efficacy general’, ‘gender’, ‘age’, ‘education’, ‘politically left wing’, ‘politically right wing’, ‘politically neither left nor right’, ‘income’), making a total of 18 variables, in relation to predicting the performance of ‘double-sided printing’. Coakes and Steed (1999) recommend that for stepwise regression, there should be 20 times the number cases as predictors. This analysis used 18 predictors, which would require 360 cases to fulfil this criterion. As 485 cases were used, this criterion was met.

Results of this analysis are presented in Table 5.11 below.
As can be seen in Table 5.11, the analysis revealed that ‘habit ds’ accounted for 60% of the variance in behaviour. ‘Procedural information ds’, ‘self-efficacy general’ and ‘infrastructure ds’ also contributed significantly to the variance. These three variables, however, only added 2% combined. Thus, it was possible that ‘habit ds’ was suppressing other variables. Therefore, the regression was re-run without including ‘habit ds’. The results of the second stepwise regression are presented in Table 5.12 below.
Table 5.12

Double-sided printing regressed onto all non-mediated variables relevant to double sided printing, excluding habit

<table>
<thead>
<tr>
<th>Model</th>
<th>Predictors</th>
<th>B</th>
<th>SE B</th>
<th>β</th>
<th>t</th>
<th>R²</th>
<th>Adj. R²</th>
<th>ΔR²</th>
<th>F</th>
<th>Error df</th>
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<td>.31</td>
<td>.31</td>
<td>218.46**</td>
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<td>14.78**</td>
<td>.31</td>
<td>.31</td>
<td>.31</td>
<td>218.46**</td>
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<td>.40</td>
<td>.09</td>
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<td>.47</td>
<td>.46</td>
<td>.02</td>
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<td>480</td>
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<td>Social norms ds</td>
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</table>

*p<.01, **p<.001

Table 5.12 shows that the second stepwise regression revealed five variables contributing to the variance in 'double-sided printing', with 'procedural information ds' accounting for 31%, 'infrastructure ds' adding a further 9%, 'comfort ds' adding another 4%, 'social norms ds' adding a further 2%, and finally, 'self-efficacy general' adding a further 1%.

ii) Reading on the screen
A stepwise regression was performed which tested all variables relevant to 'reading on the screen', that is, 5 variables specific to 'reading on the screen' (comfort/ease read, ‘leadership read’, ‘social norms read’, ‘self-efficacy read’, ‘habit read’), and 10 variables relevant to both behaviours (‘leadership general’, ‘nature experience’, ‘self-efficacy general’, ‘gender’, ‘age’, ‘education’, ‘politically left wing’, ‘politically right wing’, ‘politically neither left nor right’, ‘income’), making a total of 15 variables in relation to predicting the performance of 'reading on the screen’. Again, the Coakes and Steed (1999) criterion of 20 times the number cases as predictors was met.
The results of this regression are presented in Table 5.13 below.

Table 5.13

‘Reading on the screen’ regressed onto all non-mediated variables relevant to reading on the screen

<table>
<thead>
<tr>
<th>Model</th>
<th>Predictors</th>
<th>B</th>
<th>SE B</th>
<th>β</th>
<th>t</th>
<th>R²</th>
<th>Adj. R²</th>
<th>ΔR²</th>
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<th>Error df</th>
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<td>.48</td>
<td>437.97**</td>
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<td></td>
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<td>.48</td>
<td>.01</td>
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<td></td>
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<td>.10</td>
<td>.01</td>
<td>154.53**</td>
</tr>
<tr>
<td></td>
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<td>0.03</td>
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<td>20.61**</td>
<td>.48</td>
<td>.48</td>
<td>.01</td>
<td>225.65**</td>
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<td>.09</td>
<td></td>
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<td>.09</td>
<td>.09</td>
<td>.01</td>
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<td>.01</td>
<td>154.53**</td>
</tr>
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<td>0.03</td>
<td>.61</td>
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<td>14.40**</td>
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<td>.49</td>
<td>.01</td>
<td>154.53**</td>
</tr>
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<td>Nature experience</td>
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<td>0.03</td>
<td>.10</td>
<td></td>
<td>2.93*</td>
<td>.10</td>
<td>.10</td>
<td>.01</td>
<td>154.53**</td>
</tr>
<tr>
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<td>Comfort/ease read</td>
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<td>0.03</td>
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<td></td>
<td>2.61*</td>
<td>.11</td>
<td>.11</td>
<td>.01</td>
<td>154.53**</td>
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</table>

*p<.01, **p<.001

The analysis indicated that 'habit read' accounted for 48% of the variance in behaviour. Two other variables were included in the prediction, being ‘nature experience’ and ‘comfort/ease read’. These two variables, however, only added 1.5% combined.

As with ‘double-sided printing’ above, it was possible that ‘habit read’ was suppressing other variables and the regression was re-run without including ‘habit read’. The results of this regression are presented in Table 5.14 below.
Table 5.14

‘Reading on the screen’ regressed onto all non-mediated variables relevant to reading on the screen, excluding ‘habit read’

<table>
<thead>
<tr>
<th>Model</th>
<th>Predictors</th>
<th>B</th>
<th>SE B</th>
<th>β</th>
<th>t</th>
<th>R²</th>
<th>Adj. R²</th>
<th>ΔR²</th>
<th>F</th>
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<td>.25</td>
<td>157.52***</td>
<td>483</td>
</tr>
<tr>
<td></td>
<td>Comfort/ease read</td>
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<td>0.03</td>
<td>.50</td>
<td>12.55***</td>
<td>25</td>
<td>.24</td>
<td>.25</td>
<td>157.52***</td>
<td>483</td>
</tr>
<tr>
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<td>(Constant)</td>
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<td>0.19</td>
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<td>0.03</td>
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<td>.24</td>
<td>.25</td>
<td>91.26***</td>
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<td>0.20</td>
<td>0.05</td>
<td>.17</td>
<td>4.37***</td>
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<tr>
<td></td>
<td>(Constant)</td>
<td>1.63</td>
<td>0.21</td>
<td></td>
<td>7.84***</td>
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<tr>
<td>3</td>
<td>Comfort/ease read</td>
<td>0.35</td>
<td>0.03</td>
<td>.46</td>
<td>11.60***</td>
<td>25</td>
<td>.24</td>
<td>.25</td>
<td>65.79***</td>
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<td></td>
<td>Self-efficacy read</td>
<td>0.17</td>
<td>0.05</td>
<td>.15</td>
<td>3.64***</td>
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<td></td>
<td>Nature experience</td>
<td>0.11</td>
<td>0.03</td>
<td>.13</td>
<td>3.32**</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>(Constant)</td>
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<td>0.21</td>
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<td>7.00***</td>
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<td>4</td>
<td>Comfort/ease read</td>
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<td>0.03</td>
<td>.45</td>
<td>11.50***</td>
<td>25</td>
<td>.24</td>
<td>.25</td>
<td>51.07***</td>
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<td></td>
<td>Self-efficacy read</td>
<td>0.14</td>
<td>0.05</td>
<td>.12</td>
<td>2.95**</td>
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<tr>
<td></td>
<td>Nature experience</td>
<td>0.10</td>
<td>0.03</td>
<td>.12</td>
<td>3.16**</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Social norms read</td>
<td>0.09</td>
<td>0.04</td>
<td>.09</td>
<td>2.28*</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>(Constant)</td>
<td>1.59</td>
<td>0.21</td>
<td></td>
<td>7.41***</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>5</td>
<td>Comfort/ease read</td>
<td>0.34</td>
<td>0.03</td>
<td>.44</td>
<td>11.26***</td>
<td>25</td>
<td>.24</td>
<td>.25</td>
<td>43.41***</td>
<td>479</td>
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<tr>
<td></td>
<td>Self-efficacy read</td>
<td>0.16</td>
<td>0.05</td>
<td>.14</td>
<td>3.34**</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Nature experience</td>
<td>0.10</td>
<td>0.03</td>
<td>.12</td>
<td>3.17**</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Social norms read</td>
<td>0.16</td>
<td>0.04</td>
<td>.17</td>
<td>3.58***</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Leadership general</td>
<td>-0.12</td>
<td>0.04</td>
<td>-.14</td>
<td>-3.04**</td>
<td></td>
<td></td>
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*p>.05, **p<.01, ***p<.001

As can be seen from Table 5.14, the results of the second stepwise regression showed five variables contributing to the variance in ‘reading on the screen’. ‘Comfort/ease read’ accounted for 25% of the variance, ‘self-efficacy read’ accounted for a further 3%, ‘nature experience’ added a further 2%, ‘social norms read’ added a further 1%, and finally, ‘leadership general’ added a further 1%. 
5.4.4 Structural Equation Modeling

Structural Equation Modeling (SEM) was conducted on the data in addition to the other statistical analyses conducted. The advantage of this type of analysis is that all factors in the proposed model can be analyzed together, as opposed to splitting them into two separate analyses.

The Maximum Likelihood method was used for SEM analyses.

Double-sided printing

For ‘double-sided printing’, the model was specified as per Figure 5.18. This included all factors relevant to this behaviour from the proposed B-ECO Model (as per Chapter 3) except for demographics, as previous analysis and a large proportion of previous literature had indicated a negligible impact of demographics on EPB performance. Some of the factors comprised multiple sub-factors. All sub-factors were included in the specified model, except in the case of ‘values’. ‘Values’ was made up of four sub-factors, with ‘self-transcendence’ being the only one that appeared to have any significant and interesting impact, again based on previous analyses in the current study and previous literature. Therefore, the sub-factors of ‘self-enhancement’, ‘openness’ and ‘tradition’ were not included in the specified model for SEM analysis.
Figure 5.18. Specification of model for SEM for ‘double-sided printing’

All relevant factors for ‘double-sided printing’ have been specified into a model for SEM analysis.
Using AMOS (v. 22) the model was found to be a poor fit with the data. The model was systematically adjusted to remove poor relationships based on smallest effect size. In addition, a latent variable was created for the two different attitude variables, and this was labeled ‘attitude’. This led to the model represented in Figure 5.19. After these changes, the model was a good fit with the data (CMIN/DF = 1.08, RMSEA = 0.01).
Figure 5.19. SEM analysis for 'double-sided printing'

Figure 5.19. Relationships between variables after SEM has been conducted, for double-sided printing.
All relationships in this model were significant. The results show that the four variables tested directly for their relationship with ‘double-sided printing’ did correlate with it, and that ‘more comfortable’ and ‘self-efficacy ds’ also affected ‘double-sided printing’ indirectly through the latent variable of ‘attitudes’.

The direct effect of ‘self-efficacy ds’ on ‘double-sided printing’ was -0.13, a negative value. This may be a suppressor variable as it correlates highly with the other variables, which improves overall prediction.

This model can predict about 50% of the variance for ‘double-sided printing’.

*Reading on the screen*

For ‘reading on the screen’ a model was specified as per Figure 5.19. As with ‘double-sided printing’ above, this model included all factors relevant to this behaviour from the proposed B-ECO Model (as per Chapter 3) except for demographics and the ‘value’ sub-factors of ‘self-enhancement’, ‘openness’ and ‘tradition’.
Figure 5.20. Specification of model for SEM for 'read on screen'.

Figure 5.20. All relevant factors for 'read on the screen' have been specified into a model for SEM analysis.
Using AMOS (v. 22) a satisfactory model was not able to be fitted to the data for ‘read on the screen’ despite trying numerous alternative models.

5.5 Discussion

5.5.1 Introduction and summary of results

The aims of Study 3 were threefold. It sought to test the proposed B-ECO Model via five hypotheses, to modify the proposed B-ECO Model based on new information garnered by the study results, and to provide information about the drivers for EPB performance in an Australian urban population, particularly regarding paper use within office-based workplace settings. These aims were pursued in the context of a broader research aim, that of developing accessible theory to guide the understanding of the drivers for EPB performance.

The first and last of the Study 3 aims are addressed below through a discussion of the Study 3 results. The modifications to the proposed B-ECO Model and development of new theory follow. Discussion of the overall research project, of which Study 3 was the culmination, is also included. Limitations of the present study and directions for future research are suggested. The section ends with a short summary and final conclusions.

There are two aspects of the data that need to be considered when interpreting results. First, the responses to the ‘knowledge’ items in the questionnaire had a relatively large amount of missing data, possibly due to confusion about how to answer the multiple choice items. However, it is possible that the data were missing as respondents did not know the correct answers. Thus, the results relating to ‘knowledge’ need to be considered as not as rigorous a result as for the other factors. Secondly, the frequency results reveal that responses to a number of variables fell into a restricted range, making it more difficult to discriminate between high and low for those variables. This may have reduced the power of correlation calculations for those variables. This result may be because similar people self-selected to participate, or it may be representative of an Australian urban population.

Overall, the results from Study 3 indicate that ‘habit’ is the most influential predictor of EPB performance, followed by ‘procedural information’ and ‘convenience’.
'Specific attitudes' also appear to be influential. When other factors operate via ‘specific attitudes’ they may possibly be more influential than when they operate through ‘general attitudes’. ‘General attitudes’, ‘connected’ and ‘knowledge’ appear to be moderately influential. These are followed by ‘social norms’, ‘leadership’, ‘self-efficacy’ and ‘nature experience’, with a small amount of influence from ‘self-transcendence', and virtually none from ‘demographics’.

5.5.2 Hypotheses and general discussion

The first hypothesis, that all factors in the proposed B-ECO Model except ‘demographics' will contribute to predicting the performance of ‘double sided printing’ and ‘reading on the screen’ was supported. There were, however, surprisingly strong influences from a small number of proposed predictors, and weak or no influence from others that had been expected to exert a more powerful influence. In addition, not all of the ‘value’ indices played a role.

The results of the direct regressions for both behaviours combined, which incorporated eight factors from the B-ECO Model, clearly indicated the very powerful influence of ‘habit’ on EPB expression. Knowing how to perform an EPB (that is, possessing ‘procedural information’) also appears to be extremely important. This finding reinforces that of the literature. The next most influential factor in this analysis was ‘convenience’. The influence of ‘convenience’ was not as large as expected, but was significantly influential. The relatively small contribution of the ‘convenience’ sub-factor ‘ease’ was unexpected, as it had been prioritized as one of the most important factors. This sub-factor may not be as important as previously thought, although a wider conceptualization of ‘convenience’ still appears to be an important predictive factor.

Further, all other factors included in the direct regressions except ‘demographics' were found to have small impacts on EPB performance. Although they do play a role and should not be omitted from the model, their relative predictive power needs to be considered. ‘Demographics’ appear to have a negligible or no influence on either behaviour, and can be omitted from the model.

The mediated regression calculations incorporated the remaining four proposed predictive factors from the B-ECO Model. Regarding the ‘values' sub-factors, it was expected that ‘self-transcendence’ and ‘openness’ would be positive predictors of
EPB expression, and that ‘self-enhancement’ and ‘tradition’ would be negative predictors, and that all ‘value’ indices would be mediated by ‘attitudes’, as per previous research (see Chapter 1).

Interestingly, ‘self-transcendence’ had a negative effect when mediated by ‘specific attitudes’, and a positive effect when mediated by ‘general attitudes’ for both behaviours. This may have been caused by respondents’ self-transcendent values being activated by thoughts of the greater good. When an actual behavioural event (as opposed to broad beliefs about what to expect of society, that is, the responsibility of many other people) is anticipated, however, this awareness may not have become activated, or even caused annoyance.

‘Openness’ positively affected ‘reading on the screen’ via both categories of ‘attitudes’, but had no effect on ‘double-sided printing’. This matches with the correlation results which found a non-significant correlation of 0.04 with ‘double-sided printing’, and a significant but small correlation with ‘reading on the screen’ of 0.10. Thus, it can be concluded that having an ‘openness’ orientation can positively affect EPB performance, but not strongly, and is not as important a consideration as ‘self-transcendence’. ‘Tradition’ had no effect or a negative effect, and ‘self-enhancement’ had no effect on EPB performance. The correlation data reveal that these indices did not correlate with the performance of the behaviours in the current study. These results are in line with previous research, which suggests that ‘self-transcendence’ is the most important of the four ‘value’ indices to consider in the prediction of EPB expression.

Both ‘knowledge’ and ‘connected’ affected EPB performance through both types of ‘attitudes’, making them useful factors to include in the predictive model. The correlation data revealed them to be moderately correlated with the behaviours.

Both types of ‘attitudes’ emerged as important predictors of EPB performance in the mediated regression results. Different combinations of factors were mediated by ‘specific attitudes’ as compared to ‘general attitudes’, indicating that they may influence behaviour performance via different pathways.

Correlation data reveal that ‘specific attitudes’ correlated more highly with the performance of the two EPBs than ‘general attitudes’. This resonates with findings
from previous studies (as described in Chapter 1), which have generally found that ‘specific attitudes’ are a stronger predictor than ‘general attitudes’.

The second hypothesis, that at least some of the variables specific to only one of the two behaviours being tested will predict both behaviours, as per the proposed existence of clusters of EPBs, was partially supported. Tables 5.6 and 5.8 reveal that ‘attitudes’ and ‘self-efficacy’ specific to one behaviour significantly correlated with the other behaviour investigated in the current study. There were a number of additional predictors specific to one behaviour that were significantly correlated with the other, differing between the behaviours. Overall, more than half of the predictors specific to one behaviour significantly correlated with the other. These results support the existence of a cluster of office workplace paper saving behaviours. These initial findings may also indicate that ‘attitudes’ and ‘self-efficacy’ can both contribute to a generalizing of EPBs, and that clusters of EPBs exist.

The third hypothesis, that ‘values’, ‘knowledge’, and ‘connected’ will be mediated by ‘general attitudes’ and ‘specific attitudes’ when predicting ‘double-sided printing’ and ‘reading on the screen’, as represented in the proposed B-ECO Model, was also partially supported. As per the discussion of hypothesis one above, ‘knowledge’ and ‘connected’ clearly affected the performance of both behaviours indirectly through both ‘general attitudes’ and ‘specific attitudes’. ‘Self-transcendence’ emerged as the only one of the four ‘value’ indices to be influential in any meaningful way, and it affected the performance of the behaviours in a complicated way, depending on the specificity of the attitude.

The fourth hypothesis, that the ‘value’ indices ‘self-transcendence’ and ‘openness’ will be positive predictors of both behaviours, and that ‘self-enhancement’ and ‘tradition’ will be negative predictors was not supported. ‘Self-transcendence’ was the only value index to show a meaningful effect on EPB performance, and its route appears to be complicated, as per the discussion of hypothesis one above. These findings differ from the strong results from previous value studies which indicate a consistent positive influence of ‘self-transcendence’ on EPB performance. There may be a role for this value index that was not captured accurately in the present study. Alternatively, incorporating this factor into a comprehensive Model may have revealed more nuanced information about the way that it affects EPB performance relative to other influences than that found by previous studies.
The fifth hypothesis, that ‘convenience’, ‘social norms’ and ‘procedural information’ will be the most influential direct factors in the performance of ‘double-sided printing’ and ‘reading on the screen’ was partially supported. Although ‘convenience’ and ‘procedural information’ were strong direct predictors, they were not the most powerful and were overtaken by ‘habit’. ‘Social norms’ did not exert as strong an influence as expected.

Differences between hypothesised relative strength of factors and the findings of Study 3 may be caused by the fact that when factors are examined as part of a comprehensive model, as opposed to being studied in isolation or with just a few other factors, their true relative strengths were revealed.

It is possible that ‘habit’ emerged as such a strong predictor because the items to measure ‘habit’ were almost identical to the item asking about the frequency of performing the behaviour. Alternatively, ‘habit’ may have emerged as a powerful predictor because it is a very influential factor. As was mentioned by one of the respondents in Study 1, an educator, individuals can’t consider every one of the multitude of actions they perform as there are far too many. Thus, having an automatic behaviour is likely to produce that behaviour frequently.

Recent studies have found that habit plays a very important role in EPB expression. Thus, the finding regarding its influential role from this study is an important one.

The important role of ‘procedural information’ is also interesting. Although mentioned by a minority of participants in Study 1, this factor was not given a high focus by those participants when planning programs, perhaps because it was assumed to be present.

Only a very small effect was found for ‘leadership’. Although respondents in Study 3 were not inclined to follow their leaders, as per the stereotypical irreverent Australian, ‘leadership’ is still important as it can facilitate other factors, such as providing more convenient recycling systems (‘convenience’) or implementing legislation against carbon emissions (‘social norms’ and ‘procedural information’).

These results are mainly consistent with past findings as identified from the literature, but have also extended the scope of the examination of the drivers of EPB.
performance from examining individual or small groups of factors, to an empirically supported and comprehensive theoretical model.

The model for ‘double-sided printing’ that emerged from the SEM analysis provided additional information to the results generated by the previous statistical analyses. The model that emerged required only 4 predictive variables to account for a large amount of the variance in behaviour, being convenience (‘more comfortable’, and ‘infrastructure’), procedural information, self-efficacy (specific to the behaviour) and attitudes (both specific and general). All factors were mediated by attitudes, but also had direct relationships with the behaviour. The influence of factors that were not required in the SEM model is not revealed in this analysis due to their absence, even though many of them were previously found to correlate with the behaviour. It is possible that they do not add predictive power to the SEM model when entered individually, but rather they may interact with each other (not just with attitudes) when factors appear together.

The inability to fit the data to a SEM model for ‘read on the screen’ may indicate that the proposed B-ECO Model is not a useful way to determine drivers for this behaviour. Previous statistical analyses revealed interrelationships among the variables which were not captured by the model. This may indicate that reading on the screen is a different type of behaviour to double-sided printing, despite the fact that they are both paper-saving behaviours. It may be more useful to continue to explore smaller groups of potential predictors for reading on the screen at this time, and then as the body of research progresses, rethink the way in which the factors all fit together. As human behaviour is so complex, and as environmental issues continue to evolve, this area is one that is rich for future research possibilities.

The psychological EPB literature has traditionally concentrated on internal, psychological constructs, with a large focus on ‘attitudes’. ‘Attitudes’ on their own, however, have been found to be weak predictors of EPB performance, and other factors appear to be more influential. Often in psychological research, factors other than ‘attitudes’ are only examined in terms of how they impact on the psychological constructs that are the focus of the research, as opposed to their own contribution to behaviour. In addition, a range of potential behavioural influences arising outside the individual is often grouped together under a single category labelled ‘contextual variables’. The present research supports the idea that differentiated contextual factors can be identified, and that they are very important drivers of behaviour.
In addition, as raised in Chapter 1, the usefulness of the ‘attitude’ construct in the wider body of psychological EPB literature is limited because of the extremely broad ways ‘attitudes’ can be conceptualized. This has been partially overcome in the current research because some of the themes captured by previous attitude-EPB studies (including by the NEP) were differentiated into separate categories, such as ‘connected’, ‘knowledge’, ‘convenience’, ‘leadership’ and ‘self-efficacy’. In the current research, the measurement of ‘attitudes’ was refined to positive or negative evaluations of the behaviour in question and the environment in general.

Some of the additional concerns about previous attitude studies in this field have been overcome here. Specificity was adhered to, interaction with identified contextual variables was examined, and the suggested indirect relationships between ‘attitudes’ other factors leading to behaviour were tested.

The TRA and TPB were considered to be insufficient for the purposes of the aims of the current thesis. The questionable usefulness of the ‘intention’ variable, and the acknowledgement of the role of identified contextual variables are ways in which the current research has extended the psychological study of the route that ‘attitudes’ may take toward behavioural performance.

The ‘values’ literature contributed the ‘self-transcendence’/’self-enhancement’ and ‘openness’/’tradition’ indices to the current research project, the relevant findings of which are discussed above. Additional value theories discussed in the introduction were not directly associated with the current research, but may be able to contribute further information if the current theory was to be extended further, or if ‘values’ were to be examined in more detail. In particular, the Value-Belief-Norm Model (Stern, 2000) contributes information that adds to the understanding of the contribution of ‘values’, and in particular, the possible route of psychological mechanisms that lead to EPB performance. The idea that activist behaviours may be a differentiated group of behaviours is a particularly interesting contribution of this theory.

The current results indicate that it may be useful in psychological research regarding drivers for the performance of EPBs to consider a larger range of contextual as well as a more comprehensive list of internal factors, including their individual roles as well as how they interact with each other, than was considered in the previous literature. This is a broadening of the definition of psychological research that has
traditionally focused on psychological processes only, and extending the scope of types of factors considered will enrich the study of the drivers for behaviour.

In an analysis of the B-ECO Model, it is important to acknowledge that the division between the factors is somewhat artificial. Factors are in actuality interconnected. Some examples include that those in positions of leadership largely determine whether or not a behaviour is convenient, that values may inform attitudes and that a feeling of connection to the earth may have its genesis within nature experience.

The current results indicate that there are the same predictors for each behaviour, but that they have to be specific to that behaviour. ‘Habit’, for example, can predict both behaviours in that habitually reading on the screen will predict whether a person will read on the screen and habitually printing double sided will predict whether a person will print double-sided, but habitually printing double-sided won’t necessarily predict whether a person reads on the screen and vice-versa. Predictors need to be specific to the behaviour. This is widely recognized in the wider literature regarding ‘attitudes’, but it appears to be an important consideration for all factors where specificity is apparent.

Overall, a larger number of high correlations were found between predictive factors and ‘double sided printing’ than with ‘reading on the screen’. ‘Leadership’, for instance, had a high correlation with ‘double-sided printing’, but not with ‘reading on the screen’. This may be because ‘double-sided printing’ is a more visible EPB, a more accessible EPB, or that there is higher awareness of this behaviour’s ability to be beneficial to the environment. In addition, more people performed ‘double-sided printing’ than ‘reading on the screen’. ‘Double-sided printing’ seems to be a more established behaviour, better understood by the majority of participants, and better understood to be protective to the environment.

The high levels of positive attitudes found in this study are similar to findings from previous studies. The very high frequency of positive environmental attitudes may be due to participants self-selecting, in that only those who were already predisposed to caring about the environment responded. Alternatively, it may be an accurate reflection of the public’s attitudes, or it may be due to a social desirability effect. The same possible explanations could account for the high levels of reported EPB performance in this study.
The current results may be relevant only to the very specific behaviour of reducing paper use within Melbourne’s CBD Government department offices for a set period of time. Differing cultural and temporal contexts, as well as different behaviours, should be considered when applying the B-ECO Model in different countries or sub-cultures, at different times, and when examining different behaviours.

It is possible that the factors identified in the B-ECO Model, which influence the behaviour of individuals in offices, might also influence the activities of government and large organizations. Two interview respondents from Study 1 had thought that CEOs could be influenced by the social norms created by other businesses. Fostering an increase in the performance of EPBs which are in the control of these powerful individuals, such as legislating against carbon emissions or providing e-waste recycling facilities, would have a much larger effect on creating a healthier natural environment than targeting individual laypeople in education programs. The research by Stern (2000), however, suggests that this may not be the case.

There is only a very small amount of research in this area that has previously been conducted in Australia. These results, therefore, are particularly important for Australian practitioners, as well as being a contribution to the body of knowledge about an Australian population.

Activists may form a separate group of individuals for the purposes of understanding the drivers for the performance of EPBs. The very clear and strong presence of ‘connected’ with an apparent genesis in ‘nature experience’, particularly as children, amongst the respondents to Study 1 may indicate the importance of these two factors either for an individual’s development into an environmental ‘activist’ who then performs EPBs, or perhaps for increasing the performance of activist EPBs in the general population. Previous research by Stern et al. (1999) in a study of the Value-Belief-Norm Theory (as outlined in Chapter 1) indicated that ‘values’ followed a direct route in predicting activist EPBs, but an indirect route when predicting non-activist EPBs. ‘Values’ and a feeling of being ‘connected’ to the environment are both deeply held psychological constructs. The fact that activists appear to overcome the barriers created by other factors, such as ‘inconvenience’ via the strength of these deeply held constructs may indicate that these two factors are vitally important in motivating consistent and wide ranging EPB performance. Activating relevant ‘values’ and a feeling of being ‘connected’ to the environment in the non-activist population may contribute to overcoming barriers caused by other
factors. Interestingly, ‘nature experience’ did not exert a strong influence on Study 3 respondents’ performance of EPBs. It is possible that ‘nature experience’ awakens a feeling of being ‘connected’ to the environment for some individuals but not others, or that the strength of the feeling differs for a range of reasons.

5.5.3 Modifications to the B-ECO Model and theory development

The B-ECO Model has been modified based on the results of Study 3. Specifically, ‘demographics’ and three of the four ‘value’ indices have been eliminated, and the relative strength attributed to factors has been adjusted. The revised B-ECO Model appears in Figure 5.21 below.

The results for the two behaviours under investigation were similar, lending support to the efficacy of the B-ECO Model to predict a range of EPBs, or at least an office-based paper-saving cluster.

The B-ECO Model may require adjustment depending on cultural and temporal context.
Figure 5.21 Revised ‘B-ECO Model’ of the predictors for the performance of EPBs

1. Habit
2. Convenience
3. Procedural information
4. Social norms (actual and perceived)
5. Leadership
6. Nature experience
7. Self-efficacy
8. Environmental knowledge
9. Connection to the environment
10. Self-transcendence

EPB performance

11. Attitudes

Figure 5.21. The B-ECO Model assumes no prohibitive barriers are in place, particularly the absence of appropriate systems or infrastructure, or constraints of physical ability. Factors proposed to be more powerful predictors appear in bold.
This preliminary B-ECO Model provides a solid basis for the emergence of the B-ECO Theory.

The B-ECO Theory states that 11 factors are important in the prediction of the performance of EPBs, following the relationships outlined in the B-ECO Model. Further, it states that a combination of many factors interact to produce an EPB, and that some factors are more influential than others.

5.5.4 Practical applications of findings for professionals

One of the overall aims of the current thesis was to contribute new theory to the field of conservation psychology that would be accessible to practitioners working to foster an increase in the performance of EPBs for the betterment of the state of the natural environment. As highlighted by Geller (2002), there is not enough cross-over between academics and practitioners; ‘There have been few if any large-scale implementations of the most effective behavior change strategies for environmental protection. While many utility companies push conservation, they don't apply the most effective behavior change techniques offered by research’ (p. 526). The current research examined factors, as opposed to assessing the effectiveness of interventions. The study results will be able to be used to inform interventions created and implemented by practitioners, and to increase their effectiveness. It could do this particularly by channelling focus, or by suggesting ideas that may not have been previously included in programs. An example may be that in designing an energy-saving program, a practitioner may be guided by the B-ECO Theory to make behaviour more convenient by installing sensor lights in the bathroom, rather than on providing information about the effects of electricity use on climate change.

There are a number of findings from the overall research that may be particularly useful for program planners. ‘Habit’ should not be underestimated by program planners, and a focus on making EPBs habitual should perhaps be a priority in behaviour change programs. The finding on the power of ‘procedural information’ suggests that the inclusion of information about simply how to perform particular EPBs in a non-patronizing manner may be a simple way to increase the frequency of their performance. The results garnered here in relation to ‘self-transcendence’ may suggest that a more considered approach to ‘general attitudes’ versus ‘specific attitudes’ may influence the effectiveness of activating self-transcendent values in individuals in order to foster an increase in EPB performance. Study 1 results had
revealed that program planners believed the most important factors on which to focus in their programs were ‘social norms’, ‘incentives’ and ‘values’. The results of Study 3 indicate that these factors are important, but that program efficacy may be increased by assigning a higher priority to other factors.

In relation to ‘incentives’ in particular, previous research has indicated that they are only effective for the duration of provision of the incentive. Although not directly tested by the present research, the literature can inform program planners that ‘incentives’ may not be a long-term effective strategy to increase EPB performance. This seems to be because the provision of incentives results in individuals relying on the external motivation provided by the incentive rather than developing an internal motivation that would determine a continuation of the behaviour. Receiving an incentive for performing an EPB may activate a different psychological process to the one activated in response to receiving positive reinforcement for performing an EPB. ‘Positive reinforcement’ is a reward bestowed after a behaviour is performed, as opposed to an incentive promised before the behaviour is performed. The literature indicates that individuals are likely to perform a behaviour to receive an ‘incentive’, rather than for the intrinsic desire to perform the behaviour itself, whereas ‘positive reinforcement’ strengthens the desire to perform a behaviour for its intrinsic worth.

There is very little previous scientific research into EPBs conducted in an office setting or on paper use behaviour. Thus, the current research may be particularly useful to professionals targeting these types of behaviours. In addition, it may be particularly useful for those working in Australia targeting a range of behaviours, especially in workplace interventions where program participants are most likely to be similar to the respondents of the current study. The findings may also be able to be generalized to other settings and EPBs across time.

5.5.5 Limitations of the current study and directions for future research

A limitation of the current study was that most of the factors in the B-ECO Model comprised multiple sub-factors that have not been discriminated here as it would have created too many variables for an accessible theoretical tool. It is possible, however, that subtle differentiated aspects of factors would affect EPB performance in varying ways. Furthermore, factors that were omitted from the proposed B-ECO Model in the formative stages may play a role that was not investigated here.
In addition to the research possibilities suggested by the limitations above, many other directions for future research could be pursued. In order to increase the rigour of the B-ECO Model, it would be useful to examine a wide range of EPBs and clusters of EPBs. The mechanisms by which the factors exert their influence also requires further investigation. In addition, the subtleties of clusters of EPBs is something that would be interesting to examine further. Although the results of the current study tentatively suggest the existence of a cluster of office paper-saving EPBs, it would be enlightening to focus a future study on this proposition, incorporating a larger number and range of behaviours to examine which behaviours cluster together. Further information on clusters would have implications for the B-ECO Model, in that different clusters may be driven by different sets of predictors.

The B-ECO model was developed based on generalized findings from the literature and the interviews. As the literature indicates that there may be specific drivers for EPBs performed in a workplace, there may need to be further development of the model in future studies conducted in workplaces. It may be worth investigating the reliability of a model specifically for workplace EPBs.

Another limitation of this study was the choice to examine repetitive behaviours only, as one-off behaviours have been demonstrated to have a large environmental impact (eg. Gardner & Stern, 2008). Future studies could focus on one-off behaviours. It would be interesting to compare the results to explore whether there are similar or different drivers for these two categories of EPBs.

Further to the finding that habit is such an important factor in the performance of EPBs, it would be useful to examine how and why EPBs become habitual. Future research could examine the mechanisms by which this occurs. Findings from a study such as this could be applied by program planners.

The B-ECO Theory developed here may be a useful contribution to broader behaviour prediction theories. A comparison with alternate behaviour prediction theories may yield information to refine the B-ECO Theory, or the findings here may be able to contribute information to the understanding of the drivers of behaviour in general. In particular, the current results reveal that there is interaction between ‘attitudes’ and many other factors. The precise mechanisms by which ‘attitudes’ affect ‘behaviour’ requires further investigation within the context of a broad theory,
such as B-ECO Theory, that incorporates a greater range of factors than in those psychological theories traditionally used.

An analysis of more recent data would shed light on changes that have taken place in the drivers of EPB performance in Australia over the past decade. It would be particularly interesting to examine any correlations between changes in the drivers to perform these types of behaviours and the evolution of the understanding of environmental problems and solutions that have developed in a cultural context over this time, particularly considering the ever-changing political discourse around climate-change and the increased salience of climate-change science. Future models could also incorporate the factor of ‘identity’, as this has emerged as an interesting influential factor in the time since the B-ECO Model was originally developed.

It would be interesting to repeat the current study with an activist population to compare the predictors for EPB performance in that population with the general public. A separate model could possibly be developed for the activist group. In particular, an investigation of the special role of a feeling of ‘emotional connection to the environment’ could be pursued, as well as its possible genesis in ‘nature experience’ as a child, as suggested by the results of Study 1.

The findings presented here provide information regarding office-based paper reduction techniques in Melbourne city offices at the start of the 21st century. Further testing would be required to determine if these results can be more broadly applied to other EPBs, at other times, in other contexts, such as domestic contexts, and within other cultures.

Future research, for example, could consider other types of workplaces for comparison. For example, a Swedish study has shown that the behaviour of public-sector employees is more likely to be influenced by their environmental values than it is for those working in the private sector (Nilsson, von Borgstede & Biel, 2004). It would be interesting to investigate these types of differences in an Australian sample.

A further limitation of the study was the voluntary nature of participation in a study about environmental behaviours. This may have resulted in sample bias. It is possible that people already inclined toward preforming EPBs were more likely to participate than those not inclined toward performing these behaviours. This could
be further investigated in future studies by changing the study design to a less biased sampling technique.

The question of the existence of clusters of EPBs is one that requires further investigation. Relationships between EPBs appear to be complicated and may differ depending on temporal, spatial or cultural context. The fact that the two behaviours investigated in the current study, both paper-saving office-based behaviours, had some commonalities in the patterns of drivers, and some differences, may indicate that clusters of EPBs are difficult to identify with certainty. There do seem to be relationships between EPBs, for instance the concept of spillover, where the performance of one type of EPB spills over to influence the actor to increase other EPBs expressed (eg. Thogersen, 1999), and the rebound effect, where a decrease in the expression of an environmentally damaging behaviour results in individuals feeling justified in increasing other environmentally damaging behaviours (eg. Nassen & Holmberg, 2009). Both concepts indicate that there is some sort of interaction between the EPBs performed by individuals. The body of research, however, is not yet developed enough to support or contradict the existence of clusters of EPBs.

The current research has not distinguished between intent-oriented and impact-oriented EPBs. It would be interesting to further investigate this distinction in future research as it is likely that there would be a different pattern of drivers for the two types of EPB expression.

5.5.6 Overall summary and conclusions

Study 3 was the culmination of a large research project that developed new theory for the field of environmental psychology. The B-ECO Theory and corresponding B-ECO Model were created through a process of combining information from the literature and specialist professionals to create a proposed model of the factors that may motivate the performance of EPBs. Relationships between those factors were suggested. This model was then tested via questionnaire to office workers in Melbourne focusing on two paper-saving behaviours. The study findings were applied to refine the B-ECO Model, and a final theory evolved. The B-ECO Theory and Model would benefit from further testing, in particular, to further investigate the applicability of the model to different EPBs, but they form a useful, accessible and rigorous theory that can be applied by professionals who aim to foster the
performance of various EPBs in their work.

A major find of the current research is to reinforce the fact that psychological and contextual factors interact in a complex way to produce behaviour. This is a significant finding because it highlights the need to include a range of both types of factors in a behaviour prediction model, as opposed to traditional psychological theories which include only limited consideration of contextual factors.

The development of the B-ECO Theory is an important one for the growing field of environmental psychology. As environmental issues gain a higher priority in modern societies, the key to working toward a healthier natural environment appears to be fostering changes in human behaviour. If the B-ECO Model and B-ECO Theory can be used by practitioners to guide behaviour change programs in order to increase their effectiveness, then it has achieved the research aim of providing accessible theory to be used in this growing field.
References


IPCC (Intergovernmental Panel on Climate Change), (2013). Climate change 2013: The physical science basis. Retrieved from http://www.ipcc.ch/


APPENDIX A
Explanatory statement for Study 1

The Explanatory Statement presented below was printed onto Monash University letterhead.
EXPLANATORY STATEMENT

Increasing Environmentally Responsible Behaviour in an Office Setting.

March 2003

My name is Naomi Kowadlo and I am completing a research project under the supervision of Professor Grahame Coleman, Dr Dianne Vella-Brodrick, and Dr Evelyn Scannell, of the Psychology Department at Monash University, towards a Doctorate of Psychology.

The aim of the research is to gain an understanding of environmental education strategies currently used in Australia in order to determine what psychological research can offer to improve the effectiveness of programs.

I am seeking experts in the field of environmental education who are willing to participate in a semi-structured interview. The interview will be conducted by myself at a time and public setting convenient to you, such as an office or a café. The interview will last approximately one hour. I will take written notes and will also audio tape the interview. I will keep the written notes and audio tapes for a minimum of five years, as per university guidelines, and will destroy them after this time by shredding and over recording respectively. Until this time, they will be stored in a locked filing cabinet.

I will not include your name in the final thesis or published reports. However, I may refer broadly to your position and the type of organisation in which you work, for example, ‘The director of an environmental education organisation said…’.

You will be given a transcript of data concerning you for your approval before it is included in the write up of the research thesis, but may not be shown a transcript of the data for approval before the publication of articles that stem from the original research.

If you agree to participate you may withdraw your consent at any time by saying you would like to stop the interview. Additionally, you can decide to answer particular questions and not answer others during the course of the interview. You can also ask me to destroy the audio tape, or take it yourself. You are entitled to view the printed questions I will be asking before the interview commences. Your participation or otherwise will remain confidential if you request this.

If you have any queries or would like to be informed of the aggregate research findings, please contact Naomi Kowadlo via Grahame Coleman on ph: 9903 2247.
You can complain about the study if you don't like something about it. To complain about the study, you need to phone 9905 2052. You can then ask to speak to the secretary of the Human Ethics Committee and tell him or her that the number of the project is 2002/441. You could also write to the secretary. That person's address is:

The Secretary
The Standing Committee on Ethics in Research Involving Humans
PO Box No 3A
Monash University
Victoria 3800

Thank you,

Naomi Kowadlo
9905 9449
APPENDIX B
Consent form for Study 1

Informed Consent Form

Increasing Environmentally Responsible Behaviour in an Office Setting.

I agree to take part in the above Monash University research project. I have had the project explained to me, and I have read the Explanatory Statement, which I will keep for my records.

I understand that agreeing to take part means that I am willing to be interviewed by the researcher and that I will allow the audio-taping of the interview.

I understand that my name will not be included in the final thesis or published reports, however, I may be referred broadly by my position and the type of organisation in which I work.

I further understand that I will be given a transcript of data concerning me for my approval before it is included in the write up of the research, but may not be shown a transcript of the data for approval before the publication of articles that stem from the original research.

Signature ………………………………………………..        Date……………………………
APPENDIX C

Pilot questionnaire as presented to participants
(Study 2)
**Values**

Please rate each of the following values as being a guiding principal in your life from 0 (not important at all) to 7 (extremely important), or indicate if you are opposed to the value.

<table>
<thead>
<tr>
<th>Value</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>Opposed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loyal</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>opposed</td>
</tr>
<tr>
<td>Social power</td>
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<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>opposed</td>
</tr>
<tr>
<td>Authority</td>
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<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>opposed</td>
</tr>
<tr>
<td>Wealth</td>
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<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>opposed</td>
</tr>
<tr>
<td>Preserving my public image</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>opposed</td>
</tr>
<tr>
<td>Successful</td>
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<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>opposed</td>
</tr>
<tr>
<td>Capable</td>
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<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>opposed</td>
</tr>
<tr>
<td>Ambitious</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>opposed</td>
</tr>
<tr>
<td>Influential</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>opposed</td>
</tr>
<tr>
<td>Creativity</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>opposed</td>
</tr>
<tr>
<td>Curious</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>opposed</td>
</tr>
<tr>
<td>Freedom</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>opposed</td>
</tr>
<tr>
<td>Choosing own goals</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>opposed</td>
</tr>
<tr>
<td>Protecting the environment</td>
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<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>opposed</td>
</tr>
<tr>
<td>Trait</td>
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<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
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<td>opposed</td>
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<tr>
<td>A world of beauty</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>opposed</td>
</tr>
<tr>
<td>Unity with nature</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>opposed</td>
</tr>
<tr>
<td>Broad minded</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>opposed</td>
</tr>
<tr>
<td>Helpful</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>opposed</td>
</tr>
<tr>
<td>Honest</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>opposed</td>
</tr>
<tr>
<td>Forgive</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>opposed</td>
</tr>
<tr>
<td>Daring</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>opposed</td>
</tr>
<tr>
<td>A varied life</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>opposed</td>
</tr>
<tr>
<td>An exciting life</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>opposed</td>
</tr>
<tr>
<td>Pleasure</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>opposed</td>
</tr>
<tr>
<td>Enjoying life</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>opposed</td>
</tr>
<tr>
<td>Devout</td>
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<td>2</td>
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<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>opposed</td>
</tr>
<tr>
<td>Respect for tradition</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>opposed</td>
</tr>
<tr>
<td>Humble</td>
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<td>1</td>
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<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>opposed</td>
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<tr>
<td>Moderate</td>
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<td>1</td>
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<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>opposed</td>
</tr>
<tr>
<td>Politeness</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>opposed</td>
</tr>
<tr>
<td>Honouring parents and elders</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>opposed</td>
</tr>
<tr>
<td>Questions</td>
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<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
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<td>6</td>
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<td>Result</td>
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<tr>
<td>Obedient</td>
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<td>opposed</td>
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<tr>
<td>Self-discipline</td>
<td></td>
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<td></td>
<td>opposed</td>
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<tr>
<td>Cleanliness</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>opposed</td>
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<tr>
<td>National security</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>opposed</td>
</tr>
<tr>
<td>Social order</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>opposed</td>
</tr>
<tr>
<td>Family security</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>opposed</td>
</tr>
</tbody>
</table>
**Behaviours**

Please circle the most appropriate response from the options provided:

<table>
<thead>
<tr>
<th>I print double-sided at work.</th>
<th>Always</th>
<th>Often</th>
<th>Sometimes</th>
<th>Rarely</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>I read text on the screen, rather than printing it out for reading.</td>
<td>Always</td>
<td>Often</td>
<td>Sometimes</td>
<td>Rarely</td>
<td>Never</td>
</tr>
</tbody>
</table>

**Attitudes**

For each statement, please circle the answer which is closest to your response, from the choices below. Your first impulse is the best answer; do not spend long thinking about each question.

<table>
<thead>
<tr>
<th>I don’t mind if text is printed double or single-sided.</th>
<th>Strongly agree</th>
<th>Agree</th>
<th>Neither agree nor disagree</th>
<th>Disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>I don’t mind whether I read documents on the screen or on paper.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
<td>Strongly disagree</td>
</tr>
<tr>
<td>I find it annoying to read documents that have been printed double-sided.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
<td>Strongly disagree</td>
</tr>
</tbody>
</table>
I find it annoying to read text on the screen.                      Strongly agree  Agree  Neither agree nor disagree  Disagree  Strongly disagree

I find it more comfortable to read documents when they have been printed on only one side of the page.  Strongly agree  Agree  Neither agree nor disagree  Disagree  Strongly disagree

It is less strain on my eyes to read text on paper, rather than on the screen.  Strongly agree  Agree  Neither agree nor disagree  Disagree  Strongly disagree

It is easy to print double-sided.                                    Strongly agree  Agree  Neither agree nor disagree  Disagree  Strongly disagree

It is easy to read text on the screen.                                Strongly agree  Agree  Neither agree nor disagree  Disagree  Strongly disagree

I find it difficult to work out how to print double-sided.           Strongly agree  Agree  Neither agree nor disagree  Disagree  Strongly disagree

I find it harder to read text on the screen than I do on paper.      Strongly agree  Agree  Neither agree nor disagree  Disagree  Strongly disagree

It is a lot of effort to go through the computer procedures that would enable me to print double-sided. Strongly agree  Agree  Neither agree nor disagree  Disagree  Strongly disagree
I find it less effort to read text on paper than I do on the screen.

The printer that my computer is connected to is able to print double-sided.

There are facilities for me to use at work that allow double-sided printing.

A printer which would allow double-sided printing is further away from my desk than one which only allows single-sided printing.

My computer is not set up to automatically print double-sided.

Upper management print documents double-sided.

Upper management read on the screen rather than on printed pages.
Upper management have made double-sided printing a priority issue in my workplace. Strongly agree Agree Neither agree nor disagree Disagree Strongly disagree

Upper management have made reading on the screen a priority issue in my workplace. Strongly agree Agree Neither agree nor disagree Disagree Strongly disagree

Upper management don't care whether staff print double or single-sided. Strongly agree Agree Neither agree nor disagree Disagree Strongly disagree

Upper management don't care whether staff read on the screen, or whether they print for reading. Strongly agree Agree Neither agree nor disagree Disagree Strongly disagree

Upper management is unsupportive of double-sided printing. Strongly agree Agree Neither agree nor disagree Disagree Strongly disagree

Upper management is unsupportive of reading on the screen. Strongly agree Agree Neither agree nor disagree Disagree Strongly disagree

Upper management care about reducing paper use in the office. Strongly agree Agree Neither agree nor disagree Disagree Strongly disagree

Upper management minimise their own paper use. Strongly agree Agree Neither agree nor disagree Disagree Strongly disagree

As far as I know, upper management have not considered the environmental impact of paper use within our office. Strongly agree Agree Neither agree nor disagree Disagree Strongly disagree
<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly agree</th>
<th>Agree</th>
<th>Neither agree nor disagree</th>
<th>Disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>I have not heard much about paper use in the office from upper management.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
<td>Strongly disagree</td>
</tr>
<tr>
<td>Upper management care about looking after the environment.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
<td>Strongly disagree</td>
</tr>
<tr>
<td>Business practices in my workplace have adapted to take the environment into consideration.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
<td>Strongly disagree</td>
</tr>
<tr>
<td>The environment is not a priority issue for upper management in my workplace.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
<td>Strongly disagree</td>
</tr>
<tr>
<td>Environmental issues are core business for the organisation at which I work.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
<td>Strongly disagree</td>
</tr>
<tr>
<td>Australian governments are serious about people making an effort to reduce the amount of paper used in offices.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
<td>Strongly disagree</td>
</tr>
<tr>
<td>Australian governments aren't concerned about paper use in offices.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
<td>Strongly disagree</td>
</tr>
<tr>
<td>Statement</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
<td>Strongly disagree</td>
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</tr>
<tr>
<td>Australian governments are investing money into solving environmental problems.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
<td>Strongly disagree</td>
</tr>
<tr>
<td>Australian governments are working toward protecting the environment.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
<td>Strongly disagree</td>
</tr>
<tr>
<td>Australian governments don't care about the Greenhouse Effect.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
<td>Strongly disagree</td>
</tr>
<tr>
<td>Australian governments aren't working toward protecting the natural environment.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
<td>Strongly disagree</td>
</tr>
<tr>
<td>I have spent a lot of time in natural settings during my life (eg. bushwalks, camping)</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
<td>Strongly disagree</td>
</tr>
<tr>
<td>I spend time gardening.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
<td>Strongly disagree</td>
</tr>
<tr>
<td>I spend as little time as possible in wilderness.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
<td>Strongly disagree</td>
</tr>
</tbody>
</table>
I prefer to holiday in interesting cities than in nature (eg. beaches, forests).

I feel sad when I think about the problems facing the environment.

I feel happy when I spend time in nature.

Environmental problems don't affect me emotionally.

I feel that I am one with the earth.

I believe that the earth and my spirit are connected at a deep level.

I believe that people and nature are separate entities.
At least some of my work colleagues give me a hard time if they see me printing single-sided.

At least some of my work colleagues give me a hard time if they see me printing text out for reading.

At least some of my work colleagues routinely print double-sided.

At least some of my work colleagues routinely read on the screen.

People at work don't care whether or not I print double-sided.

People at work don't care whether or not I read on the screen.
<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly agree</th>
<th>Agree</th>
<th>Neither agree nor disagree</th>
<th>Disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>The culture at my workplace doesn't encourage double-sided printing.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
<td>Strongly disagree</td>
</tr>
<tr>
<td>The culture at my workplace doesn't encourage reading on the screen.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
<td>Strongly disagree</td>
</tr>
<tr>
<td>I know how to change my computer settings to allow double-sided printing.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
<td>Strongly disagree</td>
</tr>
<tr>
<td>I possess the required skills to read on the screen.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
<td>Strongly disagree</td>
</tr>
<tr>
<td>I read more effectively on paper than on the screen.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
<td>Strongly disagree</td>
</tr>
<tr>
<td>I don't know how to print double-sided.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
<td>Strongly disagree</td>
</tr>
<tr>
<td>Double-sided printing can make a difference to environmental problems.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
<td>Strongly disagree</td>
</tr>
<tr>
<td>Reading on the screen can make a difference to environmental problems.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
<td>Strongly disagree</td>
</tr>
<tr>
<td>Statement</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
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</tr>
<tr>
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</tr>
<tr>
<td>Small actions can have a large impact on the environment.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
<td>Strongly disagree</td>
</tr>
<tr>
<td>Double-sided printing is something positive that I can do for the environment.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
<td>Strongly disagree</td>
</tr>
<tr>
<td>Reading on the screen is something positive that I can do for the environment.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
<td>Strongly disagree</td>
</tr>
<tr>
<td>My personal actions can help the environment.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
<td>Strongly disagree</td>
</tr>
<tr>
<td>The environmental impact of my double-sided printing is so small that it is not worth doing.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
<td>Strongly disagree</td>
</tr>
<tr>
<td>The environmental impact of my reading on the screen is so small that it is not worth doing.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
<td>Strongly disagree</td>
</tr>
<tr>
<td>Offices aren’t the most important places when considering the link between paper use and environmental issues.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
<td>Strongly disagree</td>
</tr>
<tr>
<td>Statement</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
<td>Strongly disagree</td>
</tr>
<tr>
<td>--------------------------------------------------------------------------</td>
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</tr>
<tr>
<td>Even if I always double-side my printing, it won't save that much paper over the course of my career.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
<td>Strongly disagree</td>
</tr>
<tr>
<td>Even if I always read on the screen, it won't save that much paper over the course of my career.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
<td>Strongly disagree</td>
</tr>
<tr>
<td>I am just one person - no matter what I do, it won't make a difference to the environment.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
<td>Strongly disagree</td>
</tr>
<tr>
<td>I do not believe in luck or chance.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
<td>Strongly disagree</td>
</tr>
<tr>
<td>I earn the respect and honours I achieve.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
<td>Strongly disagree</td>
</tr>
<tr>
<td>The success I have is largely a matter of chance.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
<td>Strongly disagree</td>
</tr>
<tr>
<td>My life seems like a series of random events.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
<td>Strongly disagree</td>
</tr>
<tr>
<td>Statement</td>
<td>Strongly Agree</td>
<td>Agree</td>
<td>Neither Agree nor Disagree</td>
<td>Disagree</td>
<td>Strongly Disagree</td>
</tr>
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</tr>
<tr>
<td>I automatically print double-sided.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
<td>Strongly disagree</td>
</tr>
<tr>
<td>I automatically read on the screen rather than printing to read.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
<td>Strongly disagree</td>
</tr>
<tr>
<td>I print double-sided without even thinking about it.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
<td>Strongly disagree</td>
</tr>
<tr>
<td>I read on the screen without even thinking about it.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
<td>Strongly disagree</td>
</tr>
<tr>
<td>I usually forget to print double-sided.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
<td>Strongly disagree</td>
</tr>
<tr>
<td>I usually forget to read on the screen.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
<td>Strongly disagree</td>
</tr>
<tr>
<td>It is not a habit of mine to print double-sided.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
<td>Strongly disagree</td>
</tr>
<tr>
<td>It is not a habit of mine to read on the screen.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
<td>Strongly disagree</td>
</tr>
</tbody>
</table>
Double-sided printing can have a positive effect on the environment.  

<table>
<thead>
<tr>
<th>Strongly agree</th>
<th>Agree</th>
<th>Neither agree nor disagree</th>
<th>Disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
</table>

Reading on the screen can have a positive effect on the environment.  

<table>
<thead>
<tr>
<th>Strongly agree</th>
<th>Agree</th>
<th>Neither agree nor disagree</th>
<th>Disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
</table>

It is a good idea to print double-sided.  

<table>
<thead>
<tr>
<th>Strongly agree</th>
<th>Agree</th>
<th>Neither agree nor disagree</th>
<th>Disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
</table>

It is a good idea to read on the screen.  

<table>
<thead>
<tr>
<th>Strongly agree</th>
<th>Agree</th>
<th>Neither agree nor disagree</th>
<th>Disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
</table>

I don't think it's that important to double-side one's printing.  

<table>
<thead>
<tr>
<th>Strongly agree</th>
<th>Agree</th>
<th>Neither agree nor disagree</th>
<th>Disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
</table>

I don't think it's that important to read on the screen.  

<table>
<thead>
<tr>
<th>Strongly agree</th>
<th>Agree</th>
<th>Neither agree nor disagree</th>
<th>Disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
</table>

Reducing the amount of paper used can have a positive impact on the environment.  

<table>
<thead>
<tr>
<th>Strongly agree</th>
<th>Agree</th>
<th>Neither agree nor disagree</th>
<th>Disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Statement</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
</tr>
<tr>
<td>--------------------------------------------------------------------------</td>
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<td>----------</td>
</tr>
<tr>
<td>It is important to save as much paper as one can.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
</tr>
<tr>
<td>It is important to do what one can to protect the natural environment.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
</tr>
<tr>
<td>The environment is an important thing to protect.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
</tr>
<tr>
<td>Environmental issues get too much attention in the media.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
</tr>
<tr>
<td>Being an environmental activist is an important part of my identity.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
</tr>
<tr>
<td>I participate in environmental campaigning outside of work.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
</tr>
<tr>
<td>I am not an environmental activist.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
</tr>
</tbody>
</table>
Personal Reaction Inventory

Please read the below statements, and indicate whether each statement is true or false as it applies to you personally.

I sometimes feel resentful when I don’t get my way. True False

On a few occasions, I have given up doing something because I thought too little of my ability. True False

There have been times when I felt like rebelling against people in authority even though I knew they were right. True False

No matter who I’m talking to, I’m always a good listener. True False

I can remember ‘playing sick’ to get out of something. True False

There have been occasions when I took advantage of someone. True False

I’m always willing to admit it when I make a mistake. True False

I sometimes try to get even rather than forgive and forget. True False

I am always courteous, even to people who are disagreeable. True False
I have never been irked when people expressed ideas very different from my own.  True  False

There have been times when I was quite jealous of the good fortune of others.  True  False

I am sometimes irritated by people who ask favours of me.  True  False

I have never deliberately said something that hurt someone’s feelings.  True  False
**Knowledge**

Please tick as many boxes per answer as you think are correct:

Climate change is caused by:

i) An increase in the amount of water vapour in the atmosphere.
j) An increase in the amount of ‘greenhouse’ gases in the atmosphere.
k) An increase in the amount of carbon dioxide in the atmosphere.
l) The burning of fossil fuels.
m) Using petrol.
n) Using water.
o) The use of aerosol cans.
p) Don’t know.

Logging affects drinking water supply because:

f) Logging doesn’t affect water supply.
g) Forests catch rainwater which then gathers in rivers to be collected for drinking.
h) Young trees need more water than older trees.
i) It results in increased sediment in rivers.
j) Don’t know.

What are the problems with waste going to landfill?

f) It can contribute to climate change.
g) Most communities don’t support a landfill in their ‘backyard’.
h) Many things that end up in landfill could be recycled and the resources used more fully.
i) There are few problems with waste going to landfill because full tips are covered and the land is used for other purposes.
j) Don’t know.
**Demographics**

For this section, please tick the box that applies to you.

I am:  
- male  
- female

My age group is:  
- 18-25  
- 26-29  
- 30-39  
- 40-49  
- 50-59  
- 60 or over

My highest completed level of education is:  
- Primary  
- Secondary  
- Tertiary

I would classify myself as politically:  
- More left wing  
- More right wing  
- I don’t care about politics  
- Neither left nor right leaning

My income before tax is in the range of:  
- $40,000 or under  
- $41,000 - $50,000  
- $51,000 - $60,000  
- $61,000 - $70,000

- $71,000 - $80,000  
- $81,000 - $90,000  
- $91,000 +
APPENDIX D
Explanatory statement for Study 2
February 2007

Explanatory Statement – Pilot study

Examining the motivation for the performance of environmentally preferred behaviour.

This information sheet is for you to keep.

My name is Naomi Castelan and I am conducting a research project under the supervision of Prof. Grahame Coleman, a Professor in the Department of Psychology, and Dr Dianne Vella-Brodrick, a lecturer in the Department of Psychology, towards a Professional Doctorate of Psychology, at Monash University. This means that I will be writing a thesis which is the equivalent of a 300 page book.

I am seeking people over the age of 18 years, who work in a corporate setting in Victoria, Australia and who speak English, to participate in this study. You are being invited to participate as you work in such a context.

The aim of the research is to gain an understanding of the factors that may encourage or discourage people from performing environmentally preferable behaviours in the office.

If you agree to participate you will be asked to fill out a written questionnaire, and then to provide written comments about the questionnaire itself. The questionnaire should take approximately 15 minutes of your time, and the written comments approximately 10 minutes, making your participation under 30 minutes in total.

You will not receive any personal benefit by filling out the questionnaire, but you will be assisting the development of a questionnaire which will be used to contribute to a body of knowledge about the types of factors which encourage or discourage the performance of environmentally preferred behaviour. The research results may assist professionals in this field to work more effectively to make workplaces more environmentally friendly.
Taking part in this study is voluntary and you are under no obligation to consent to participation. However, if you do consent to participate, you may withdraw prior to the questionnaire and your comments being submitted. (As questionnaires and comments will be anonymous they will not be identifiable for the purposes of withdrawing them from the study once they have been submitted). Additionally, you may avoid answering questions which you feel are too personal or intrusive.

Your participation is confidential, and I will not be collecting any information which could identify you at any stage.

Storage of the data collected will adhere to Monash University regulations and data will be kept on University premises in a locked cupboard or filing cabinet for 5 years, after which time it will be destroyed. Access to data during these five years will be by researchers only.

An article about the study may be submitted for publication in a scientific journal, but individual participants will not be identifiable in such an article.

If you would like to be informed of the aggregate research finding, please contact Naomi Castelan via Grahame Coleman on 9905 5988. The findings will be accessible for one year after the completion of the study (expected to be May 2007). Please note that the researcher will not contact you with results of the study.

<table>
<thead>
<tr>
<th>If you would like to contact the researchers about any aspect of this study, please contact the Chief Investigator:</th>
<th>If you have a complaint concerning the manner in which this research 2006/0(TBA) is being conducted, please contact:</th>
</tr>
</thead>
</table>
| **Prof. Grahame Coleman** | Human Ethics Officer  
Standing Committee on Ethics in Research Involving Humans (SCERH)  
Building 3e Room 111  
Research Office  
Monash University VIC 3800 |

Thank you.

Naomi Castelan.
APPENDIX E

Instructions for Study 2
Instructions to pilot study participants

Examining the motivation for the performance of environmentally preferred behaviour.

- Please fill out the attached survey.
- Please time approximately how long it took you to complete the survey, and make a note here ______.
- Please provide any comments about the survey, such as any questions which you felt were difficult to understand, whether there is anything about the questionnaire which annoyed you, whether there were any issues about the order of the questions etc.
- Please send the completed questionnaire and your comments to Naomi Castelan, care of Grahame Coleman, in the provided pre-paid envelope.

Thank you very much for your time.
## APPENDIX F
### Reliabilities for Study 2

<table>
<thead>
<tr>
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<td>Attitudes - very general</td>
<td>.815</td>
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<tr>
<td>Protect</td>
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<tr>
<td>Important to protect</td>
<td>.725</td>
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<tr>
<td>Media</td>
<td>.909</td>
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<tr>
<td>Procedural info - ds</td>
<td>.824</td>
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<tr>
<td>Know how</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>Don’t know how</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>Procedural info - overall</td>
<td>.638</td>
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<tr>
<td>Know how</td>
<td>.409</td>
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<tr>
<td>Required skills</td>
<td>.579</td>
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<tr>
<td>Effectively</td>
<td>.742</td>
<td></td>
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<tr>
<td>Don’t know how</td>
<td>.371</td>
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</tr>
</tbody>
</table>

* This item was negative and violates reliability model assumptions.
APPENDIX G

Variables included in the final questionnaire for Study 3, and items used to measure the variables.
<table>
<thead>
<tr>
<th>Name of factor from the B-ECO Model</th>
<th>Names of variables</th>
<th>Items to measure variable</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Behaviour</strong></td>
<td>Double-sided printing behaviour</td>
<td>- At work, I print double-sided.</td>
</tr>
<tr>
<td><strong>Convenience</strong></td>
<td>Comfort/ease ds</td>
<td>- It is easy to print double-sided.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- I find it more comfortable to read documents when they have been printed on only one side of the page.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- It is a lot of effort to go through the computer procedures that would enable me to print double-sided.</td>
</tr>
<tr>
<td><strong>Infrastructure ds</strong></td>
<td></td>
<td>- The printer that my computer is connected to is able to print double-sided.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- There are facilities for me to use at work that allow double-sided printing.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- My computer is not set up to automatically print double-sided.</td>
</tr>
<tr>
<td><strong>Social norms</strong></td>
<td>Social norms ds</td>
<td>- The culture at my workplace encourages double-sided printing.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- At least some of my work colleagues give me a hard time if they see me printing single-sided.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- People at work don’t care whether or not I print double-sided.</td>
</tr>
<tr>
<td><strong>Leadership</strong></td>
<td>Leadership ds</td>
<td>- Upper management print documents double-sided.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Upper management have made double-sided printing a priority issue in my workplace.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Upper management don’t care whether staff print double or single-sided.</td>
</tr>
<tr>
<td><strong>Attitudes</strong></td>
<td>Attitudes specific ds</td>
<td>- Double-sided printing can have a positive effect on the environment.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- It is a good idea to print double-sided.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- I don’t think its that important to double-side one's printing.</td>
</tr>
<tr>
<td><strong>Procedural information</strong></td>
<td>Procedural information ds</td>
<td>- I know how to change my computer settings to allow double-sided printing.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- I don’t know how to print double sided.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- I don’t know how to connect my computer to a printer that can print double-sided.</td>
</tr>
<tr>
<td><strong>Self-efficacy</strong></td>
<td>Self-efficacy ds</td>
<td>- Double-sided printing can make a difference to environmental problems.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Double-sided printing is something positive that I can do for the environment.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- The environmental impact of my double-sided printing is so small that it is not worth doing.</td>
</tr>
<tr>
<td><strong>Habit</strong></td>
<td>Habit ds</td>
<td>- I automatically print double-sided.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- I print double-sided without even thinking about it.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- It is not a habit of mine to print double-sided.</td>
</tr>
</tbody>
</table>
**Table G.2  Variables specific to ‘reading on the screen’**

<table>
<thead>
<tr>
<th>Name of factor from the B-ECO Model</th>
<th>Names of variables</th>
<th>Items to measure variable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Behaviour</td>
<td>Reading on the screen behaviour</td>
<td>- At work, I read text on the screen, rather than printing it out for reading.</td>
</tr>
</tbody>
</table>
| Convenience                        | Comfort/ease read | - I don't mind whether I read documents on the screen or on paper.  
- I find it less effort to read text on paper than I do on the screen  
- I find it annoying to read text on the screen. |
| Social norms                       | Social norms read | - The culture at my workplace encourages reading on the screen in preference to printing to read.  
- At least some of my work colleagues routinely read on the screen rather than printing to read.  
- People at work don't care whether or not I read on the screen rather than printing to read. |
| Leadership                         | Leadership read | - Upper management read on the screen rather than on printed pages.  
- Upper management have made reading on the screen, rather than printing to read, a priority issue in my workplace.  
- Upper management don't care whether staff read on the screen, or whether they print for reading. |
| Attitudes                          | Attitudes specific read | - [Reading on the screen, rather than printing to read, can have a positive effect on the environment.] - either left out, or doubled??  
- It is a good idea to read on the screen, rather than printing to read.  
- I don't think its that important to read on the screen rather than printing to read. |
| Self-efficacy                      | Self-efficacy read | - Reading on the screen, rather than printing to read, can make a difference to environmental problems.  
- The environmental impact of my reading on the screen, rather than printing to read, is so small that it is not worth doing.  
- Even if I always read on the screen, rather than printing to read, it won't save that much paper over the course of my career. |
| Habit                              | Habit read | - I automatically read on the screen, rather than printing to read.  
- I read on the screen, rather than printing to read, without even thinking about it.  
- It is not a habit of mine to read on the screen, rather than printing to read. |
<table>
<thead>
<tr>
<th>Name of factor from the B-ECO Model</th>
<th>Names of variables</th>
<th>Items to measure variable</th>
</tr>
</thead>
</table>
| Leadership                         | Leadership general| - Upper management care about looking after the environment.  
- Business practices in my workplace have adapted to take the environment into consideration.  
- The environment is not a priority issue for upper management in my workplace. |
| Nature experience                   | Nature experience | - I have spent a lot of time in natural settings during my life (eg. bushwalks, camping)  
- I spend as little time as possible in wilderness.  
- I prefer to holiday in interesting cities than in nature (eg. beaches, forests) |
| Demographics                        | Gender            | Choose category (see Appendix H) |
|                                     | Age               | Choose category (see Appendix H) |
|                                     | Education         | Choose category (see Appendix H) |
|                                     | Political orientation | Choose category (see Appendix H) |
|                                     | Income            | Choose category (see Appendix H) |
| Values                              | Self-transcendence| Rate guiding principals (see Appendix H) |
|                                     | Self-enhancement  | Rate guiding principals (see Appendix H) |
|                                     | Openness to change| Rate guiding principals (see Appendix H) |
|                                     | Tradition         | Rate guiding principals (see Appendix H) |
| Environmental knowledge             | Knowledge score   | Three multiple choice items – see Appendix H (Correct answers are 1a, 1b, 2a, 2c, 3b, 3c.) |
| Connection to the environment       | Connected         | - I feel sad when I think about the problems facing the environment.  
- I believe that the earth and my spirit are connected at a deep level.  
- Environmental problems don't affect me emotionally. |
| Attitudes                           | Attitudes general | - It is important to do what one can to protect the natural environment.  
- The environment is an important thing to protect.  
- Environmental issues get too much attention in the media. |
| Self-efficacy                       | Self-efficacy general | - Small actions can have a large impact on the environment.  
- My personal actions can help the environment.  
- I am just one person - no matter what I do, it won't make a difference to the environment |
APPENDIX H

Final questionnaire as presented to participants
### Values

Please rate each of the following values as being a **guiding principle in your life** from 0 (not important at all) to 7 (extremely important), or indicate if you are opposed to the value.

<table>
<thead>
<tr>
<th>Value</th>
<th>Rating</th>
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<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>National security</td>
<td>opposed</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Preserving my public image</td>
<td>opposed</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
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<td>Ambitious</td>
<td>opposed</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Wealth</td>
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<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Choosing own goals</td>
<td>opposed</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Respect for tradition</td>
<td>opposed</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Unity with nature</td>
<td>opposed</td>
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<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Self-discipline</td>
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<td>2</td>
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<td>6</td>
<td>7</td>
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<tr>
<td>Obedient</td>
<td>opposed</td>
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<td>6</td>
<td>7</td>
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<tr>
<td>A varied life</td>
<td>opposed</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
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<tr>
<td>An exciting life</td>
<td>opposed</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
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<tr>
<td>Social order</td>
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<td>3</td>
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<tr>
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<tr>
<td>Honouring parents and elders</td>
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<tr>
<td>Forgiving</td>
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<tr>
<td>Honest</td>
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<tr>
<td>Pleasure</td>
<td>opposed 0 1 2 3 4 5 6 7</td>
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<td>Moderate</td>
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<tr>
<td>Social power</td>
<td>opposed 0 1 2 3 4 5 6 7</td>
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<tr>
<td>Enjoying life</td>
<td>opposed 0 1 2 3 4 5 6 7</td>
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<tr>
<td>A world of beauty</td>
<td>opposed 0 1 2 3 4 5 6 7</td>
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<tr>
<td>Influential</td>
<td>opposed 0 1 2 3 4 5 6 7</td>
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<td>Broad minded</td>
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</tr>
<tr>
<td>Politeness</td>
<td>opposed 0 1 2 3 4 5 6 7</td>
<td></td>
<td></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>Family security</td>
<td>opposed 0 1 2 3 4 5 6 7</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Successful</td>
<td>opposed 0 1 2 3 4 5 6 7</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Creativity</td>
<td>opposed 0 1 2 3 4 5 6 7</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Humble</td>
<td>opposed 0 1 2 3 4 5 6 7</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
Devout

Cleanliness

Helpful

Capable

Protecting the environment

Authority

Loyal

Freedom

**Behaviours**

Please click on the most appropriate response from the options provided:

At work, I print double-sided. Always Often Sometimes Rarely Never

At work, I read text on the screen, rather than printing it out for reading. Always Often Sometimes Rarely Never
Attitudes

Respondents answered items in this section on a 5-point Likert scale comprising 'strongly disagree', 'disagree', 'neither agree nor disagree', 'agree' and 'strongly agree', and were presented as in the following example:

SAMPLE ITEM:

People at work don't care whether or not I print double-sided. Strongly Disagree         Neither agree nor disagree         Agree         Strongly agree

For each statement, please click on the answer which is closest to your response. Your first impulse is the best answer; do not spend long thinking about each question.

Double sided printing

1. I know how to change my computer settings to allow double-sided printing.
2. It is a good idea to print double-sided.
4. Upper management have made double-sided printing a priority issue in my workplace.
5. I print double-sided without even thinking about it.
6. Double-sided printing can have a positive effect on the environment.
7. At least some of my work colleagues give me a hard time if they see me printing single-sided.
8. It is a lot of effort to go through the computer procedures that would enable me to print double-sided.
9. The printer that my computer is connected to is able to print double-sided.
10. Upper management don't care whether staff print double or single-sided.
11. My computer is not set up to automatically print double-sided.
12. People at work don't care whether or not I print double-sided.
13. Double-sided printing can make a difference to environmental problems.
14. It is not a habit of mine to print double-sided.
15. I don't think it's that important to double-side one's printing.
16. There are facilities for me to use at work that allow double-sided printing.
17. I find it more comfortable to read documents when they have been printed on only one side of the page.
18. The culture at my workplace encourages double-sided printing.
19. I automatically print double-sided.
20. The environmental impact of my double-sided printing is so small that it is not worth doing.
21. Double-sided printing is something positive that I can do for the environment.
22. I don't know how to connect my computer to a printer that can print double-sided.
23. I don't know how to print double-sided.
24. It is easy to print double-sided.

Reading on the screen

1. I don't think it's that important to read on the screen, rather than printing to read.
2. It is not a habit of mine to read on the screen, rather than printing to read.
3. I find it annoying to read text on the screen.
4. I read on the screen, rather than printing to read, without even thinking about it.
5. Upper management read on the screen rather than on printed pages.
6. Even if I always read on the screen, rather than printing to read, it won't save that much paper over the course of my career.
7. I don't mind whether I read documents on the screen or on paper.
8. Reading on the screen, rather than printing to read, can make a difference to environmental problems.
9. Upper management don't care whether staff read on the screen, or whether they print for reading.
10. The environmental impact of my reading on the screen, rather than printing to read, is so small that it is not worth doing.
11. Upper management have made reading on the screen, rather than printing to read, a priority issue in my workplace.
12. Reading on the screen, rather than printing to read, can make a difference to environmental problems.
13. The culture at my workplace encourages reading on the screen, in preference to printing to read.
14. People at work don't care whether or not I read on the screen, rather than printing to read.
15. It is a good idea to read on the screen, rather than printing to read.
16. At least some of my work colleagues routinely read on the screen, rather than printing to read.
17. I automatically read on the screen, rather than printing to read.
18. I find it less effort to read text on paper than I do on the screen.
Miscellaneous

1. Environmental problems don't affect me emotionally.
2. The environment is an important thing to protect.
3. I feel sad when I think about the problems facing the environment.
4. I have spent a lot of time in natural settings during my life (eg. bushwalks, camping)
5. I believe that the earth and my spirit are connected at a deep level.
6. I am just one person - no matter what I do, it won't make a difference to the environment.
7. It is important to do what one can to protect the natural environment.
8. Business practices in my workplace have adapted to take the environment into consideration.
9. My personal actions can help the environment.
10. The environment is not a priority issue for upper management in my workplace.
11. Small actions can have a large impact on the environment.
12. I spend as little time as possible in wilderness.
13. Environmental issues get too much attention in the media.
14. Upper management care about looking after the environment.
15. I prefer to holiday in interesting cities than in nature (eg. beaches, forests).
Knowledge

Please click on as many boxes per answer as you think are correct, or indicate if you don’t know the answer:

1. The greenhouse effect would be enhanced by:
   
   a) Increased water vapour in the atmosphere.
   b) Increased gases in the atmosphere.
   c) Increased absorption of the sun’s radiation by forests.
   d) Increased absorption of CO2 by the oceans.
   e) Don’t know.

2. Humans are thought to be contributing directly to global warming by:

   a) The burning of fossil fuels.
   b) Adopting vegetarian diets.
   c) Logging of forests.
   d) Reducing species diversity
   e) Don’t know.

3. Using large amounts of office paper can cause environmental problems because:

   a) Chopping down trees to make paper releases CO2 and can contribute to climate change.
   b) Production of office paper uses large amounts of energy, releasing CO2 into the atmosphere.
   c) Loss of trees to make paper can result in the loss of habitat for animals.
   d) Plantations grown for paper release excess CO2 to the atmosphere.
   e) Don’t know.
**Demographics**

For this section, please click on the box that applies to you.

I am:  
- male  
- female  

My age group is:  
- 18-25  
- 26-29  
- 30-39  
- 40-49  
- 50-59  
- 60 or over  

My highest completed level of education is:  
- Primary  
- Secondary  
- Tertiary  

I would classify myself as politically:  
- More left wing  
- More right wing  
- Neither left nor right leaning  
- I don't care about politics  

My income before tax is in the range of:  
- $40,000 or under  
- $41,000 - $50,000  
- $51,000 - $60,000  
- $61,000 - $70,000  
- $71,000 - $80,000  
- $81,000 - $90,000  
- $91,000 +
APPENDIX I
Template invitation
to participate in Study 3

To all staff,

Please find attached a link to an on-line survey which is part of Monash University research examining the reasons that people do or do not perform environmentally friendly behaviours around the office. The results will be used to enhance our EMS, and may also contribute to increasing the effectiveness of EMS's in offices worldwide.

Our organisation has decided to take part in this important research for two reasons; to receive information on the patterns of behaviour within the organisation, and also to contribute to this research which may have positive environmental impact.

The researcher needs a range of people to complete the survey in order to make the results robust. So, whether you are a passionate greenie or have never heard of the Greenhouse Effect, whether you recycle your post-its or don’t know where the recycling bin is, whether you never print anything or always print everything, please consider taking part in this study.

Your involvement is completely anonymous. It will only take 10-15 minutes of your time, and is an invaluable resource for our company.

I strongly urge you to take the time to complete the survey. You will be doing [name of organisation] – and the planet – a big favour.

Signed…

Senior Manager.
APPENDIX J
Explanatory statement for Study 3

EXPLANATORY STATEMENT FOR PARTICIPANTS

Examining the motivation for the performance of environmentally preferred behaviour.

You are being invited to participate in research being conducted at Monash University which is examining the reasons that people do or do not perform behaviours which are environmentally friendly.

My name is Naomi Castelan and I am conducting this research project under the supervision of Prof. Grahame Coleman, a Professor in the Department of Psychology, and Dr Dianne Vella-Brodrick, a lecturer in the Department of Psychology, towards a Professional Doctorate of Psychology, at Monash University.

I am seeking people over the age of 18 years who work in a Government Department in a corporate setting in Victoria, Australia and who speak English, to participate in this study. You are being invited to participate as you work in such a context.

If you agree to participate you will be asked to fill out an electronic questionnaire which should take approximately 10-15 minutes of your time.

You will not receive any personal benefit by filling out the questionnaire, but you will be contributing to a body of knowledge about the types of factors which encourage or discourage the performance of environmentally preferred behaviour. The research results may assist professionals in this field to work more effectively to make workplaces more environmentally friendly.

Taking part in this study is voluntary and you are under no obligation to consent to participation. However, if you do consent to participate, you may withdraw prior to the questionnaire being submitted. (As questionnaires will be anonymous, individual questionnaires will not be identifiable for the purposes of withdrawing them from the study once they have been submitted). Additionally, you may avoid answering questions which you feel are too personal or intrusive.

Your participation is confidential, and I will not be collecting any information which could identify you at any stage.

Storage of the data collected will adhere to Monash University regulations and data will be kept on University premises in a locked cupboard or filing cabinet for 5 years, after which time it will be destroyed by shredding. Access to data during these five years will be by researchers only.
An article about the study may be submitted for publication in a scientific journal, but individual participants will not be identifiable in such an article.

If you would like to be informed of the aggregate research findings, please contact Naomi Castelan via Grahame Coleman on 9905 5988. The findings will be accessible for one year after the completion of the study (expected to be July 2007). Please note that the researcher will not contact you with results of the study.

<table>
<thead>
<tr>
<th>If you would like to contact the researchers about any aspect of this study, please contact the Chief Investigator:</th>
<th>If you have a complaint concerning the manner in which this research 2006/047 is being conducted, please contact:</th>
</tr>
</thead>
</table>
| Prof. Grahame Coleman | Human Ethics Officer  
Standing Committee on Ethics in Research Involving Humans (SCERH)  
Building 3e Room 111  
Research Office  
Monash University VIC 3800 |

Thank you.  
Naomi Castelan.
APPENDIX K
Reliabilities for Study 3

The ‘Attitude’ section of the questionnaire used in Study 3 measured a number of variables, each one consisting of three items. Once the study was complete and negative items had been recoded, reliability analysis was conducted to test whether respondents had answered these items in a similar way, that is, could each set of three items be considered together to represent a valid construct. Where reliabilities were low, the construction of the variable was reconsidered. The sets of items to measure each variable, the reliability data, and adjustments to which items represent which variables, are set out below.

Reliability analysis was not conducted for the items pertaining to values, knowledge or demographics.

Many factors could have had slightly higher Cronbach’s alphas if one item was deleted, leaving only two items to measure that factor. However, in all except two cases (comfort/ease ds and comfort/ease read) the difference was slight and it was thought it would be preferable to have the lower alpha but to also have the benefit of the factor being measured by three items rather than two.

Convenience 1 - Comfort/Ease

Double-sided printing
Cronbach’s alpha for these three items together = .597

<table>
<thead>
<tr>
<th>Item</th>
<th>Chronbach’s alpha if item deleted</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. It is easy to print double-sided.</td>
<td>.388</td>
</tr>
<tr>
<td>2. I find it more comfortable to read documents when they have been</td>
<td>.694</td>
</tr>
<tr>
<td>printed on only one side of the page.</td>
<td></td>
</tr>
<tr>
<td>3. It is a lot of effort to go through the computer procedures that</td>
<td>.413</td>
</tr>
<tr>
<td>would enable me to print double-sided.</td>
<td></td>
</tr>
</tbody>
</table>

This factor was divided up into two sub-factors; items 1 and 3 became ‘ease of double-sided printing’ with a Cronbach’s alpha of .694, and item 2 became its own sub-factor called ‘comfort of double-sided printing’. This factor had been two factors in the pilot study, distinguished between ease and comfort, so when the item that would raise the alpha considerably for this factor if it was removed pertained to ‘comfort’, when the other two items pertained to ‘ease’, it made sense to separate them out again.
### Reading on the screen
Cronbach's alpha for these three items together = .589

<table>
<thead>
<tr>
<th>Item</th>
<th>Chronbach's alpha if item deleted</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I don't mind whether I read documents on the screen or on paper.</td>
<td>.671</td>
</tr>
<tr>
<td>2. I find it less effort to read text on paper than I do on the screen</td>
<td>.427</td>
</tr>
<tr>
<td>3. I find it annoying to read text on the screen.</td>
<td>.305</td>
</tr>
</tbody>
</table>

It was decided to eliminate item 1 from the analysis, so that 'comfort/ease read' was made up of items 2 and 3, and had an alpha of .671, rather than the alpha of .589 if all items were left in. Unlike above, item 2 pertained to ease, and item 3 pertained to comfort, thus this factor was classified as comfort/ease, rather than separating them out.

### Convenience 2 - Infrastructure / systems
Double-sided printing
Cronbach's alpha for these three items together = .657

<table>
<thead>
<tr>
<th>Item</th>
<th>Chronbach's alpha if item deleted</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The printer that my computer is connected to is able to print double sided.</td>
<td>.433</td>
</tr>
<tr>
<td>2. There are facilities for me to use at work that allow double sided printing.</td>
<td>.543</td>
</tr>
<tr>
<td>3. My computer is not set up to automatically print double sided.</td>
<td>.721</td>
</tr>
</tbody>
</table>

### Business leadership
Double-sided printing
Cronbach's alpha for these three items together = .771

<table>
<thead>
<tr>
<th>Item</th>
<th>Chronbach's alpha if item deleted</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Upper management print documents double sided</td>
<td>.699</td>
</tr>
<tr>
<td>2. Upper management have made double sided printing a priority issue in my workplace.</td>
<td>.566</td>
</tr>
<tr>
<td>3. Upper management don't care whether staff print double or single sided.</td>
<td>.781</td>
</tr>
</tbody>
</table>

### Reading on the screen
Cronbach's alpha for these three items together = .684

<table>
<thead>
<tr>
<th>Item</th>
<th>Chronbach's alpha if item deleted</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Upper management read on the screen rather than on printed pages.</td>
<td>.692</td>
</tr>
<tr>
<td>2. Upper management have made reading on the screen, rather than printing to read, a priority issue in my workplace.</td>
<td>.472</td>
</tr>
<tr>
<td>3. Upper management don't care whether staff read on the screen, or whether they print for reading.</td>
<td>.568</td>
</tr>
</tbody>
</table>

### General
Cronbach's alpha for these three items together = .832

<table>
<thead>
<tr>
<th>Item</th>
<th>Chronbach's alpha if item deleted</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Upper management care about looking after the environment.</td>
<td>.697</td>
</tr>
<tr>
<td>2. Business practices in my workplace have adapted to take the environment into consideration.</td>
<td>.837</td>
</tr>
<tr>
<td>3. The environment is not a priority issue for upper management in my workplace.</td>
<td>.754</td>
</tr>
</tbody>
</table>
### Nature experience

**General**

Cronbach’s alpha for these three items together = .766

<table>
<thead>
<tr>
<th>Item</th>
<th>Chronbach’s alpha if item deleted</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I have spent a lot of time in natural settings during my life (eg. bushwalks, camping)</td>
<td>.645</td>
</tr>
<tr>
<td>2. I spend as little time as possible in wilderness.</td>
<td>.641</td>
</tr>
<tr>
<td>3. I prefer to holiday in interesting cities than in nature (eg. beaches, forests)</td>
<td>.769</td>
</tr>
</tbody>
</table>

### Connection to the environment (Emotional/spiritual)

**General**

Cronbach’s alpha for these three items together = .595

<table>
<thead>
<tr>
<th>Item</th>
<th>Chronbach’s alpha if item deleted</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I feel sad when I think about the problems facing the environment.</td>
<td>.432</td>
</tr>
<tr>
<td>2. I believe that the earth and my spirit are connected at a deep level.</td>
<td>.588</td>
</tr>
<tr>
<td>3. Environmental problems don’t affect me emotionally.</td>
<td>.475</td>
</tr>
</tbody>
</table>

### Social norms

**Double-sided printing**

Cronbach’s alpha for these three items together = .669

<table>
<thead>
<tr>
<th>Item</th>
<th>Chronbach’s alpha if item deleted</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The culture at my workplace encourages double sided printing.</td>
<td>.494</td>
</tr>
<tr>
<td>2. At least some of my work colleagues give me a hard time if they see me printing single sided.</td>
<td>.711</td>
</tr>
<tr>
<td>3. People at work don’t care whether or not I print double sided.</td>
<td>.493</td>
</tr>
</tbody>
</table>

### Reading on the screen

Cronbach’s alpha for these three items together = .680

<table>
<thead>
<tr>
<th>Item</th>
<th>Chronbach’s alpha if item deleted</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The culture at my workplace encourages reading on the screen in preference to printing to read.</td>
<td>.423</td>
</tr>
<tr>
<td>2. At least some of my work colleagues routinely read on the screen rather than printing to read.</td>
<td>.711</td>
</tr>
<tr>
<td>3. People at work don’t care whether or not I read on the screen rather than printing to read.</td>
<td>.555</td>
</tr>
</tbody>
</table>

### Procedural information

**Double-sided printing**

Cronbach’s alpha for these three items together = .862

<table>
<thead>
<tr>
<th>Item</th>
<th>Chronbach’s alpha if item deleted</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I know how to change my computer settings to allow double-sided printing.</td>
<td>.874</td>
</tr>
<tr>
<td>2. I don’t know how to print double sided.</td>
<td>.755</td>
</tr>
<tr>
<td>3. I don’t know how to connect my computer to a printer that can print double-sided.</td>
<td>.780</td>
</tr>
</tbody>
</table>
### Self-efficacy - perceived power over environmental problems.

**Double-sided printing**
Cronbach’s alpha for these three items together = .770

<table>
<thead>
<tr>
<th>Item</th>
<th>Cronbach’s alpha if item deleted</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Double sided printing can make a difference to environmental problems.</td>
<td>.701</td>
</tr>
<tr>
<td>2. Double sided printing is something positive that I can do for the environment.</td>
<td>.627</td>
</tr>
<tr>
<td>3. The environmental impact of my double sided printing is so small that it is not worth doing.</td>
<td>.747</td>
</tr>
</tbody>
</table>

**Reading on the screen**
Cronbach’s alpha for these three items together = .701

<table>
<thead>
<tr>
<th>Item</th>
<th>Cronbach’s alpha if item deleted</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Reading on the screen, rather than printing to read, can make a difference to environmental problems.</td>
<td>.748</td>
</tr>
<tr>
<td>2. The environmental impact of my reading on the screen, rather than printing to read, is so small that it is not worth doing.</td>
<td>.454</td>
</tr>
<tr>
<td>3. Even if I always read on the screen, rather than printing to read, it won't save that much paper over the course of my career.</td>
<td>.596</td>
</tr>
</tbody>
</table>

**General**
Cronbach’s alpha for these three items together = .718

<table>
<thead>
<tr>
<th>Item</th>
<th>Cronbach’s alpha if item deleted</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Small actions can have a large impact on the environment.</td>
<td>.586</td>
</tr>
<tr>
<td>2. My personal actions can help the environment.</td>
<td>.590</td>
</tr>
<tr>
<td>3. I am just one person - no matter what I do, it won't make a difference to the environment.</td>
<td>.723</td>
</tr>
</tbody>
</table>

### Habit

**Double-sided printing**
Cronbach’s alpha for these three items together = .884

<table>
<thead>
<tr>
<th>Item</th>
<th>Cronbach’s alpha if item deleted</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I automatically print double sided.</td>
<td>.785</td>
</tr>
<tr>
<td>2. I print double sided without even thinking about it.</td>
<td>.785</td>
</tr>
<tr>
<td>3. It is not a habit of mine to print double sided.</td>
<td>.920</td>
</tr>
</tbody>
</table>

**Reading on the screen**
Cronbach’s alpha for these three items together = .819

<table>
<thead>
<tr>
<th>Item</th>
<th>Cronbach’s alpha if item deleted</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I automatically read on the screen rather than printing to read</td>
<td>.692</td>
</tr>
<tr>
<td>2. I read on the screen rather than printing to read without even thinking about it.</td>
<td>.773</td>
</tr>
<tr>
<td>3. It is not a habit of mine to read on the screen rather than printing to read.</td>
<td>.781</td>
</tr>
</tbody>
</table>
### Attitudes 1 - specific

**Double-sided printing**
Cronbach’s alpha for these three items together = .710

<table>
<thead>
<tr>
<th>Item</th>
<th>Chronbach’s alpha if item deleted</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Double sided printing can have a positive effect on the environment.</td>
<td>.590</td>
</tr>
<tr>
<td>2. It is a good idea to print double sided.</td>
<td>.592</td>
</tr>
<tr>
<td>3. I don’t think its that important to double side one’s printing.</td>
<td>.703</td>
</tr>
</tbody>
</table>

**Reading on the screen**
Cronbach’s alpha for these two items together = .588

<table>
<thead>
<tr>
<th>Item</th>
<th>Chronbach’s alpha if item deleted</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. [Reading on the screen, rather than printing to read, can have a positive effect on the environment.] – <strong>This item was accidentally omitted.</strong></td>
<td></td>
</tr>
<tr>
<td>2. It is a good idea to read on the screen, rather than printing to read.</td>
<td>Negative average covariance among items.</td>
</tr>
<tr>
<td>3. I don’t think its that important to read on the screen rather than printing to read.</td>
<td>Negative average covariance among items.</td>
</tr>
</tbody>
</table>

### Attitudes 2 - general

**General**
Cronbach’s alpha for these three items together = .612

<table>
<thead>
<tr>
<th>Item</th>
<th>Chronbach’s alpha if item deleted</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. It is important to do what one can to protect the natural environment.</td>
<td>.457</td>
</tr>
<tr>
<td>2. The environment is an important thing to protect.</td>
<td>.457</td>
</tr>
<tr>
<td>3. Environmental issues get too much attention in the media.</td>
<td>.674</td>
</tr>
</tbody>
</table>

**Same items**
One item accidentally appeared twice.
Cronbach’s alpha for these two items together = .773

<table>
<thead>
<tr>
<th>Item</th>
<th>Chronbach’s alpha if item deleted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reading on the screen, rather than printing to read, can make a difference to environmental problems.</td>
<td>Negative average covariance among items.</td>
</tr>
<tr>
<td>Reading on the screen, rather than printing to read, can make a difference to environmental problems.</td>
<td>Negative average covariance among items.</td>
</tr>
</tbody>
</table>
### Final summary table of factors used in analysis, and their alpha scores.

<table>
<thead>
<tr>
<th>Factor name</th>
<th>Cronbach’s alpha</th>
<th>Number of items making up the factor</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ease ds</td>
<td>.694</td>
<td>2</td>
<td>Ds</td>
</tr>
<tr>
<td>Comfort ds</td>
<td>-</td>
<td>1</td>
<td>Ds</td>
</tr>
<tr>
<td>Comfort/ease read</td>
<td>.671</td>
<td>2</td>
<td>Read</td>
</tr>
<tr>
<td>Infrastructure</td>
<td>.657</td>
<td>3</td>
<td>Ds</td>
</tr>
<tr>
<td>Business leadership specific ds</td>
<td>.771</td>
<td>3</td>
<td>Ds</td>
</tr>
<tr>
<td>Business leadership specific read</td>
<td>.684</td>
<td>3</td>
<td>Read</td>
</tr>
<tr>
<td>Business leadership, general</td>
<td>.832</td>
<td>3</td>
<td>General</td>
</tr>
<tr>
<td>Nature experience</td>
<td>.766</td>
<td>3</td>
<td>General</td>
</tr>
<tr>
<td>Connected to environment</td>
<td>.595</td>
<td>3 (if delete any, alpha goes down)</td>
<td>General</td>
</tr>
<tr>
<td>Social norms ds</td>
<td>.669</td>
<td>3</td>
<td>Ds</td>
</tr>
<tr>
<td>Social norms read</td>
<td>.680</td>
<td>3</td>
<td>Read</td>
</tr>
<tr>
<td>Procedural info ds</td>
<td>.862</td>
<td>3</td>
<td>Ds</td>
</tr>
<tr>
<td>Self-efficacy ds</td>
<td>.768</td>
<td>3</td>
<td>Ds</td>
</tr>
<tr>
<td>Self-efficacy read</td>
<td>.805</td>
<td>3</td>
<td>Read</td>
</tr>
<tr>
<td>Self-efficacy general</td>
<td>.716</td>
<td>3</td>
<td>General</td>
</tr>
<tr>
<td>Habit ds</td>
<td>.884</td>
<td>3</td>
<td>Ds</td>
</tr>
<tr>
<td>Habit read</td>
<td>.819</td>
<td>3</td>
<td>Read</td>
</tr>
<tr>
<td>Attitudes specific to ds</td>
<td>.744</td>
<td>3</td>
<td>Ds</td>
</tr>
<tr>
<td>Attitudes specific to read</td>
<td>.592</td>
<td>2</td>
<td>Read</td>
</tr>
<tr>
<td>Attitudes, general</td>
<td>.654</td>
<td>3</td>
<td>General</td>
</tr>
</tbody>
</table>

Only 1 item discarded (from comfort/ease read).

This table does not include information pertaining to items that measured values, knowledge or demographics.
### APPENDIX L

**Multicollinearity correlations**

Table 1
Correlations between all sub-factors, and all other sub-factors, except ‘political’, in relation to double-sided printing

<table>
<thead>
<tr>
<th></th>
<th>Ease ds</th>
<th>Infrastructur e</th>
<th>More comfortabl e</th>
<th>L’s hips ds</th>
<th>Social norms ds</th>
<th>Proc edural info ds</th>
<th>Sel f-effic acy ds</th>
<th>Hab its</th>
<th>Att spec ds</th>
<th>L’s hip general</th>
<th>Na tur e exp</th>
<th>Sel f-effic acy general</th>
<th>Attit udes general</th>
<th>Kno wled ge score</th>
<th>Conn ected</th>
<th>Se lf-trans c</th>
<th>Self- enhanc e</th>
<th>Ope nnese s</th>
<th>Tradi tiona l</th>
<th>Ge nde r</th>
<th>Age</th>
<th>Edu catio n</th>
<th>Inc om e</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ease ds</td>
<td>.53**</td>
<td>.29*</td>
<td>.3 1*</td>
<td>.3 7*</td>
<td>.64*</td>
<td>.27 **</td>
<td>.6 3*</td>
<td>.3 6*</td>
<td>.2 4**</td>
<td>.1 6**</td>
<td>.18 **</td>
<td>.21 **</td>
<td>.12*</td>
<td>.09</td>
<td>.0</td>
<td>- .01</td>
<td>.08</td>
<td>.00</td>
<td>.01</td>
<td>.0 1</td>
<td>-.10*</td>
<td>.02</td>
<td></td>
</tr>
<tr>
<td>Infrastructur e</td>
<td>.12*</td>
<td>.3 8*</td>
<td>.4 2*</td>
<td>.55*</td>
<td>.13 **</td>
<td>.6 3*</td>
<td>.2 5*</td>
<td>.2 3**</td>
<td>.0 6</td>
<td>.08</td>
<td>.09 *</td>
<td>.18*</td>
<td>.02 **</td>
<td>- .02</td>
<td>- .03</td>
<td>- .05</td>
<td>- .10*</td>
<td>- .07</td>
<td>.08</td>
<td>.06</td>
<td>- .04</td>
<td>.05</td>
<td></td>
</tr>
<tr>
<td>More comfortabl e</td>
<td>.1 2*</td>
<td>.2 0*</td>
<td>.13*</td>
<td>.3 7*</td>
<td>.3 4*</td>
<td>.1 5*</td>
<td>.1 9*</td>
<td>.26 **</td>
<td>.1 8*</td>
<td>.17**</td>
<td>.15 **</td>
<td>.00 **</td>
<td>.10*</td>
<td>- .02</td>
<td>- .02</td>
<td>- .05</td>
<td>- .05</td>
<td>- .07</td>
<td>.05</td>
<td>- .02</td>
<td>- .05</td>
<td>.05</td>
<td></td>
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*p<.05, **p<.01
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Correlations between all sub-factors, and all other sub-factors, except ‘political’, in relation to reading on the screen

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