

13 Measuring environmental behaviour

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13.1 INTRODUCTION

The goal of much environmental psychology research is to help understand and change **environmental behaviour**. In order to do this it is essential to develop robust measures of this behaviour. This chapter reviews some of the ways in which scholars have approached environmental behaviour and its measurement to date. It addresses three important issues: what to measure (behaviour or impact of behaviour), how to measure it (by means of self-reports or observation) and how to conceptualise it (uni- or multidimensional). Each of these three issues should be considered when developing a measure of environmental behaviour as decisions on them have theoretical, methodological and practical implications.

13.2 WHAT TO MEASURE? BEHAVIOUR OR IMPACT

Stern, Dietz, Ruttan, Socolow and Sweeney (1997) suggest it is important to make a distinction between measures of behaviour and measures of impact. Measuring impact is not the same as measuring behaviour and the two different types of measures may therefore not necessarily overlap.

Environmental behaviour

Most research in environmental psychology focuses on studying **pro-environmental behaviour**. Other often used terms to typify this type of behaviour are environmentally friendly behaviour (Dolnicar & Grün, 2009), ecological behaviour or conservation behaviour (e.g. Scherbaum, Popovich, & Finlinson, 2008; Schultz, Khazian, & Zaleski, 2008). There are different definitions of this type of behaviour. Kollmuss and Agyeman (2002), for instance, define pro-environmental behaviour as 'behaviour that consciously seeks to minimize the negative impact of one's actions on the natural and built world' (p. 240). This type of behaviour can therefore be labelled as **goal-directed pro-environmental behaviour** – behaviour which people adopt with an explicit goal of doing something beneficial for the environment. Kaiser and Wilson (2004) suggest that environmental psychology can and should only be concerned with studying this type of goal-directed behaviour (see also Greve, 2001). Steg and Vlek

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(2009a), on the other hand define **pro-environmental behaviour** as 'behaviour that harms the environment as little as possible, or even benefits the environment' (p. 309). This is behaviour that is beneficial for the environment but is not necessarily (or exclusively) motivated by environmental goals. According to this definition people can act pro-environmentally without any intention to do so, for instance, because the behaviour is habitual (e.g. you always turn the tap off when brushing your teeth) or because the behaviour is motivated by other goals (e.g. not driving to work because cycling is cheaper and healthier).

Pro-environmental behaviour (whether goal-directed or not) should be distinguished from the broader term environmental behaviour. Steg and Vlek (2009a) define environmental behaviour as 'all types of behaviour that change the availability of materials or energy from the environment or alter the structure and dynamics of ecosystems or the biosphere' (p. 309). This includes behaviours which are environmentally damaging as well as behaviours which are beneficial for the environment. Arguably this includes almost all kinds of behaviour as almost everything we do has some sort of impact on the environment. Measures of actual impact (see below) necessarily include both behaviours which are environmentally damaging as well as behaviours which are environmentally sound.

Decisions on what to measure should be informed by the theoretical and practical aims of a study. Goal-directed pro-environmental behaviour is by definition motivated by environmental goals, but may not necessarily reflect actual impact. A study that aims to understand the link between pro-environmental behaviour and environmental attitudes or values may measure goal-directed pro-environmental behaviour. A study that aims to examine behavioural responses to a particular intervention may measure general environmental behaviour. And a study that aims to test the effectiveness of an intervention on actual environmental impact of households may measure such impact through meter readings of electricity or gas use.

Environmental impact

Environmental psychologists typically try to measure behaviours rather than the outcomes of such behaviours in terms of **environmental impact**. However, it has been argued that measuring environmental impact may be more relevant for environmental policy as it is more likely to help to attain the ultimate real-life objective of policies, which is to reduce the ecological footprint of individuals – their overall environmental impact (e.g. McKenzie-Mohr, 2000; Oskamp, 2000a).

There are several reasons why measures of behaviour may not necessarily reflect actual impact (Gatersleben, Steg, & Vlek, 2002; Olson, 1981; Stern et al. 1997). First, behaviour measures often rely on self-reports which are sensitive to response biases (Schwarz, 1999) and thus may not reliably reflect actual behaviour. Consequently they cannot accurately reflect environmental impact (e.g. energy use). Second, when scholars develop lists of behaviours to measure their constructs they rarely consider environmental impact. The most environmentally significant behaviours may therefore not be included in such measures. Also, when composite measures of

BOX 13.1 BIASES IN ASSESSMENTS OF ENVIRONMENTAL IMPACT OF BEHAVIOURS

Gatersleben and colleagues (2002) investigated the environmental impact of various household activities (e.g. heating, washing) of more than 1200 Dutch households. Respondents estimated the average annual impact of the activities about the same (2.8–2.9 on a 5-point scale: 1 = very low, 5 = very high). However, the average actual energy use related to the activities varied substantially from 7.2 gigajoules for washing to 47

gigajoules for home heating. Figure 13.1 shows that differences in the perceived environmental impact of the household activities do not correspond with differences in estimated actual impact (in energy use) of these activities, suggesting that individuals are not always aware of the relative environmental impact of their activities.

pro-environmental behaviour are developed, variables are rarely weighted with their relative impact. A person conducting seven out of ten behaviours is therefore labelled to be more environmentally friendly than a person adopting only three of these behaviours. But this may not be a valid conclusion if those three behaviours have a more significant environmental impact. This may be particularly important when people are unaware of the environmental impact of their behaviour (see Box 13.1 and Figure 13.1).

If the main focus of a study is to understand the variables that influence actual environmental impact, the outcome variable may be different from when the focus is on measuring behaviour. One possibility could be to include only behaviours that are particularly significant in terms of environmental impact, such as car use (e.g. Stern, 2000). Another option could be to directly measure outcome variables such as energy use (via meter readings), waste production (via bin weighing) or motor fuel use instead of underlying behaviours (e.g. Schultz et al. 2008; Nigbur, Lyons, & Uzzell, 2010). Finally, behaviours could be measured by means of self-reports or observations, and then weighted with assessments of the relative environmental impact of these behaviours before combining these variables into an overall measure of impact (e.g. Abrahamse, Steg, Vlek, & Rothengatter, 2007; Gatersleben et al. 2002). Based on this last principle, environmental scientists have developed comprehensive measures to assess environmental impacts in various domains, such as measures of carbon footprints (e.g. Druckman & Jackson, 2009) and measures of direct and indirect energy use (Abrahamse et al., 2007; Gatersleben et al., 2002). The advantage of these measures is that they can provide a better understanding of psychological factors in tackling the environmental impact of lifestyles because they integrate measures of behaviour and impact.

It should be noted that measuring the actual environmental impact of behaviour is complex. The link between behaviour and impact may be easy to establish for some behaviours but not for others. Environmental problems are diverse and involve prob-

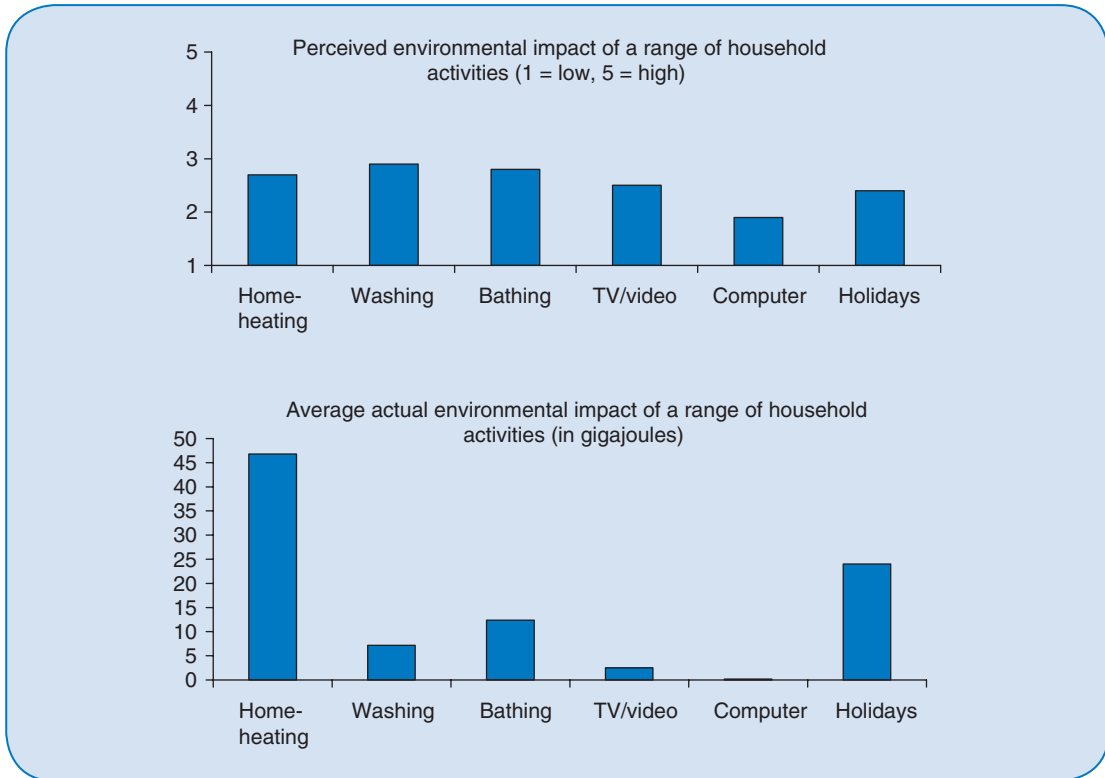


Figure 13.1 Perceived (upper panel) and average actual (lower panel) environmental impact of household activities. See Box 13.1 for an explanation.

Adapted from Gatersleben et al. (2002).

lems on local and global scales in many different areas, including pollution, resource depletion and noise (Vlek, 2000). Therefore, behaviour may be beneficial for the environment at one level but harmful at another. For instance, buying organic food may reduce the use of harmful pesticides but this food may be transported longer distances by plane. When studying the variables that play a role in explaining or changing actual environmental impact, it is important to consider these potentially conflicting issues and to take advice from environmental scientists.

The question of whether to measure environmental behaviour or the impact of behaviour is a source of debate. Some argue that a focus on impact is useful when the goal of research is to provide clear policy insight (e.g. Gatersleben et al. 2002; McKenzie-Mohr, 2000; Oskamp, 2000a) whereas others argue that the aim of psychology can only be to understand behaviour and not the impact of such behaviour (Kaiser & Wilson, 2004), as impact is influenced by many other factors including technology. These fundamental issues should be considered when determining which measure of environmental behaviour is most suitable for a study: a measure of behaviour, impact or a combination of these.

13.3 HOW SHOULD ENVIRONMENTAL BEHAVIOUR BE MEASURED?

Several issues need to be taken into account when developing measures of environmental behaviour as well as measures of actual impact, in particular when such measures rely on self-reports. Self-reported behaviour, such as recycling frequency, and self-reported outcomes, such as car mileage or energy use, are typically measured using questionnaires. For instance, typical items of pro-environmental behaviour tend to ask for some sort of judgement on how often individuals (or households) perform a behaviour, e.g. 'I usually recycle old newspapers' (1 = totally disagree to 5 = totally agree) or 'How often do you recycle old newspapers?' (1 = never to 5 = always). The main advantages of this type of question are that it is easy to administer and it allows easy comparisons across behaviours and the use of conventional statistical techniques such as factor analyses in order to explore underlying clusters of behaviour. Unfortunately, however, such self-reports are also subject to response bias (such as social desirability or self-serving biases) and measurement error (e.g. Olson, 1981). Also, whereas questionnaires tend to measure individual behaviours many behavioural decisions take place on a household level.

Perhaps more accurate self-report measures of actual behaviour ask people more detailed questions (or calculations), e.g. 'In the last week what percentage of your drink cans did you dispose of in a recycling bin?' Moreover, one could ask all individuals in a household to report on their behaviour. This type of questioning may elicit more detailed data, although it is still subject to measurement error and response biases. Moreover, it can result into complex questions that are not easy for people to understand (resulting in more response bias) or which require calculation and a lot of detailed knowledge from respondents (e.g. exact times that lights are switched on and off or the exact volume of materials that is recycled). The latter is also the case for self-reports of outcomes of behaviour. For instance, it can be difficult for people to read their own gas and electricity meters or to reliably report on their car mileage. Moreover, more accurate measures can result into more complex questionnaires as different behaviours may need to be measured on different scales (e.g. daily, weekly, monthly, annually), making it less straightforward to subject the data to standard data analysis techniques and making responses more sensitive to errors.

The most accurate form of measurement may be the observation of actual behaviour (e.g. observing littering or recycling) or its immediate outcomes (e.g. weighing bins, reading meters). This, however, can be labour intensive and therefore require extra financial resources. Information technologies such as smart meters may reduce these problems, but these can raise issues around ethics due to potential privacy infringement (Bolderdijk, 2010). Observations are much less common in environmental psychology than self-reports; although there are exceptions (e.g. Bolderdijk, Knockaert, Steg, & Verhoef, 2011; Nigbur et al. 2010; Schultz et al. 2008).

13.4 MULTI- AND UNIDIMENSIONAL CONCEPTUALISATION OF ENVIRONMENTAL BEHAVIOUR

Measures of environmental behaviour often conceptualise this behaviour as multi-dimensional. These studies tend to suggest that it is not valid to cluster a range of different behaviours along one dimension because these behaviours are not necessarily correlated. For instance, when someone recycles their glass bottles this does not necessarily mean that they also vote for a Green Party or refrain from driving a car. Kaiser and Wilson (2004), however, developed a unidimensional notion of goal-directed pro-environmental behaviour, which suggests that such behaviour can be conceptualised and measured as a one-dimensional construct.

Multidimensional conceptions of environmental behaviour

Measures of environmental behaviour usually focus either on one type of behaviour, such as recycling (e.g. Guagnano, Stern, & Dietz, 1995), transportation mode choice (e.g. Matthies, Kuhn, & Klockner, 2002) or political activism (e.g. signing petitions, donating money; Berenguer, 2007), or they include a range of different behaviours. When respondents are questioned about a range of behaviours, their responses are often subjected to some form of statistical exploration to examine whether different categories of behaviour can and should be distinguished, for example, waste avoidance, recycling, consumerism or political activism (Berger, 1997; Corraliza & Berenguer, 2000; Dolnicar & Grün, 2009; Karp, 1996; Milfont, Duckit, & Cameron, 2006; Oreg & Katz-Gerro, 2006). Based on statistical analyses of the bivariate correlations of various behaviours, most of this research suggests that pro-environmental behaviour is multidimensional. Different behaviours are motivated by different variables (e.g. McKenzie-Mohr, Nemiroff, Beers, & Desmarais, 1995) and people do not appear to behave consistently pro-environmentally across different domains (i.e. some behaviours are not or weakly correlated). Moreover, the same motivational goal (doing something beneficial for the environment) may motivate one person to donate to charity, another to buy organic, and yet another to use a bicycle rather than a car. There is plenty of evidence to suggest that pro-environmental behaviours do not correlate reliably sometimes even within but certainly not across different domains, and that engagement in one pro-environmental behaviour does not necessarily spill over to another one (Thøgersen & Ölander, 2003).

A unidimensional conception of environmental behaviour

Kaiser and Wilson (2004) developed a **unidimensional measure of goal-directed pro-environmental behaviour** within what is called the **Campbell paradigm** (Campbell,

1963; see also Kaiser, Byrka, & Hartig, 2010). According to this paradigm, all behaviours regarding a specific goal or attitude object (e.g. environmental conservation) form a transitively ordered set of behaviours (from easy to difficult). The level of engagement in these behaviours reflects the strength of a person's environmental attitude.

The underlying idea of the unidimensional measure is that people generally favour undemanding behaviours over more strenuous or costly ones. The more obstacles a person overcomes and the more effort that person puts into implementing his or her goal (e.g. environmental conservation), the stronger that person's commitment to the goal. On the other hand, when a slight obstruction is enough to stop someone from taking behavioural steps beyond the easiest ones, devotion to the environmental goal is likely to be low.

Conceptualising goal-directed pro-environmental behaviour of individuals in this manner implies that seemingly diverse behaviours, such as financial contributions to environmental organisations, recycling and vegetarianism, form a uniform set of behaviours. This in turn means that different behaviours which are linked by one underlying goal (i.e. environmental conservation) can be mapped onto one dimension. Along this dimension, the behaviours are distinct only in terms of their difficulties. Kaiser and Wilson (2004) found that energy conservation, waste avoidance, recycling, vicarious acts toward conservation (e.g. political activism), and ecological transportation and consumer behaviour can indeed be mapped on one dimension (see also Kaiser, Oerke, & Bogner, 2007).

The Rasch model (Bond & Fox, 2001) can be used as the mathematical description of the Campbell paradigm. The Rasch model is commonly used to estimate performance or ability. For instance, items on a knowledge test can be ordered from easy (answered correctly by most people) to difficult (answered correctly by only a few). A person's score on the scale then represents both the difficulty of the question and the person's knowledge of the topic. Kaiser and Wilson (2004) use the Rasch model to order pro-environmental behaviours in a data set from most frequently adopted (the easiest) to least frequently adopted (the most difficult). They assume that people adopt behaviour cost-effectively. Therefore behaviours that are adopted by the vast majority of people are presumed to be easy, whereas behaviours which are adopted by only a few people are presumed to be difficult and only those with strong pro-environmental attitudes (or goals) will adopt them.

Unlike other measures of pro-environmental behaviour, Kaiser and colleagues' unidimensional measure represents as much a measure of a person's pro-environmental attitude as well as their overall behavioural performance (Kaiser et al., 2007), thereby departing from common views of attitude-behaviour relationships which perceive attitudes and behaviours as distinct psychological concepts. This unidimensional measure has the advantage that it allows one to make a relatively simple distinction between more and less pro-environmental individuals and to include a wide variety of behaviours. However, it fundamentally rests on the assumption that behaviours are psychologically linked by one single underlying goal (doing something good for the environment). This appears to conflict with the notion that environmental problems (and solutions) are multidimensional (e.g. Vlek,

2000) and that different behaviours may be motivated by different antecedents (see Chapter 18).

13.5 SUMMARY

This chapter has given an overview of different approaches to the measurement and conceptualisation of environmental behaviour. First, it has been explained that pro-environmental or environmentally friendly behaviour should be distinguished from the broader concept of environmental behaviour, which includes any kind of behaviour that can be damaging or beneficial for the environment. Furthermore, a distinction was made between pro-environmental behaviour, which is beneficial to the environment, and goal-directed pro-environmental behaviour, which aims to be beneficial to the environment. Because the actual environmental impact of behaviour may differ from the intended impact, the chapter has also discussed several measures of environmental impact, along with a discussion of the fundamental issues involved in choosing between measures of behaviour or impact. The last parts of the chapter focused on multidimensional and unidimensional conceptualisations of environmental behaviour. In particular, a unidimensional approach to measuring goal-directed pro-environmental behaviour was discussed which makes a distinction between more and less pro-environmental individuals based on the difficulty of the behaviours that they have adopted. In general, it can be concluded that three factors need to be considered when developing a measure of environmental behaviour: what to measure (impact or behaviour), how to measure it (self-report or observation), and how to conceptualise it (uni- or multidimensional). Answers to one of these questions will affect answers to other questions but one answer may not exclude another. For instance, a measure of behaviour can help answer questions on motivations but can also be linked to a measure of impact to answer both questions about motivations and impact.

GLOSSARY

- Campbell paradigm** A paradigm that explains the probability of a person engaging in a pro-environmental behaviour as a function of (a) that person's pro-environmental attitude and (b) the difficulty of that behaviour. The Rasch model describes the Campbell paradigm mathematically.
- environmental behaviour** Any behaviour that has an impact on the environment (good or bad).
- environmental impact** The environmental outcomes of behaviours in terms of energy and materials use and waste production.
- goal-directed pro-environmental behaviour** Behaviour which people adopt with the deliberate goal of doing something beneficial for the environment.

pro-environmental behaviour Behaviour which harms the environment as little as possible or even benefits it.

unidimensional measure of goal-directed pro-environmental behaviour A measure based on the Campbell paradigm which orders environmental behaviours along one dimension from easy to difficult.

SUGGESTIONS FOR FURTHER READING

Gatersleben, B., Steg, L., & Vlek, C. (2002). The measurement and determinants of environmentally significant consumer behaviour. *Environment and Behaviour*, 34, 335–362.

Kaiser, F. G., & Wilson, M. (2004). Goal-directed conservation behaviour. The specific composition of a general performance. *Personality and Individual Differences*, 36, 1531–1544.

REVIEW QUESTIONS

1. Define environmental behaviour, pro-environmental behaviour and goal-directed pro-environmental behaviour.
2. Why do measures of environmental behaviour not necessarily reflect environmental impact and how can this be resolved?
3. What are the advantages and disadvantages of self-reported behaviour measures?
4. Describe how the environmental attitude–behaviour relationship is defined following the Campbell paradigm.