



Review

The influence of farmer demographic characteristics on environmental behaviour: A review



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ABSTRACT

Many agricultural studies have observed a relationship between farmer demographic characteristics and environmental behaviours. These relationships are frequently employed in the construction of models, the identification of farmer types, or as part of more descriptive analyses aimed at understanding farmers' environmental behaviour. However, they have also often been found to be inconsistent or contradictory. Although a considerable body of literature has built up around the subject area, research has a tendency to focus on factors such as the direction, strength and consistency of the relationship – leaving the issue of causality largely to speculation. This review addresses this gap by reviewing literature on 4 key demographic variables: age, experience, education, and gender for hypothesised causal links. Overall the review indicates that the issue of causality is a complex one. Inconsistent relationships can be attributed to the presence of multiple causal pathways, the role of scheme factors in determining which pathway is important, inadequately specified measurements of demographic characteristics, and the treatment of non-linear causalities as linear. In addition, all demographic characteristics were perceived to be influenced (to varying extents) by cultural-historical patterns leading to cohort effects or socialised differences in the relationship with environmental behaviour. The paper concludes that more work is required on the issue of causality.

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1. Farmer demographics characteristics and environmental behaviour – the issue

Agricultural studies have long observed a relationship between farmers' environmental behaviour and a variety of demographic characteristics. For example, features such as age, education and gender can influence decision-making with respect to entry into agri-environmental schemes (e.g. [Wilson and Hart, 2000](#); [Lambert et al., 2007](#)), environmental enhancement of the farm ([Jay, 2005](#); [Siebert et al., 2006](#)), adoption of new technologies ([Austen et al., 2002](#); [Adrian et al., 2005](#)), and intensity of production and land use ([Ondersteijn et al., 2003](#); [Solano et al., 2006](#)), to name but a few. In a rural setting where the demographic profile of farming populations is changing rapidly ([Cole and Donovan, 2008](#); [Hamblin, 2009](#)) understanding how demographic factors influence decision-making is important for designing and targeting environmental and resource management programs ([Lambert et al., 2007](#); [Bohnet et al., 2011](#)). This is increasingly significant in light of long-term environmental issues such as climate change where

the time-frame for response means that policies need to consider socio-demographic change in populations in order to promote effective action (see [Below et al., 2012](#)).

Both quantitative and qualitative investigations of farmers' environmental behaviour almost always include measures of the characteristics of the farm owner/manager (although less of other household members – [Burton, 2006](#)) including age, education, experience and gender. These personal features are measured because they influence the choices people make, and consequently provide an indication of how one group of farmers (e.g. older, female, less experienced, better educated) will behave given a particular circumstance. Understanding how they influence behaviour enables them to contribute to purposes such as constructing economic or Multi-Agent System (MAS) models (e.g. [Bakker & van Doorn, 2008](#); [Valbuena et al., 2008](#)), identifying similar farmer types or styles (e.g. [Brodt et al., 2006](#); [Iraizoz et al., 2007](#)), or as part of a more generic analysis to understand, for example, the past or future uptake of agri-environmental policy (e.g. [Wilson, 1997](#); [Raymond and Brown, 2011](#)).

Considerable attention has been paid to this issue in the literature. In particular, comment has been made on the direction of influence and the strength and reliability of the relationships. However, perhaps surprisingly, the issue of causality is often either

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not mentioned or justified on the basis of only one or a limited number of research papers out of a complex mass of often contradictory claims (e.g. [Smithers and Furman, 2003](#); [Raymond and Brown, 2011](#)). This makes both the interpretation of relationships and the making of informed decisions concerning which characteristics to measure or use in analysis rather difficult. The objective of this paper is to address this gap by collecting and examining casual explanations that have emerged in the literature. To achieve this, the hypothesised connections between four commonly measured demographics (age, experience, education, and gender) are critically discussed and presented in a framework diagram indicating the connections between demographics, hypothesised causalities, and environmental behaviours. The paper concludes by raising six key issues for future research.

2. Methodology

To understand the connection between demographic characteristics and environmental behaviours first requires a definition of which farming behaviours are 'environmental' and which are not. In general the literature is fairly liberal about what an 'environmental behaviour' constitutes. Entry into agri-environmental schemes, environmental outreach programs, and the adoption of more environmentally benign methods in agriculture are widely regarded as environmental behaviours (e.g. [Bager and Proost, 1997](#); [Crabtree et al., 1998](#); [Ondersteijn et al., 2003](#); [Kabii and Horwitz, 2006](#); [Jackson-Smith and McEvoy, 2011](#)). In this review 'environmental behaviour' thus refers to engagement with agri-environmental/conservation programs or farming practices that are widely accepted as more environmentally benign than intensive agriculture or that improve biodiversity on the farm. It is important to note, however, that these behaviours are not necessarily indicative of pro-environmental *attitudes* as there are many other reasons for engaging in 'environmental behaviours', for example, to improve the appearance of the farm, prevent stock losses, or obtain agri-environmental subsidies with limited behavioural change ([Jay, 2005](#); [Burton and Wilson, 2006](#)). Issues of how specific 'types' of environmental behaviours are related to demographic characteristics are outlined in the text where relevant to the discussion.

Initially this research was part of a wider unpublished report that examined the influence of social and structural variables against a number of behaviours (not just environmental) to assist in the construction of farmer agents for an MAS ([Burton, 2009](#)). Information on the casual links has been drawn primarily from this source. However, the literature list has also been extensively updated, the original ideas refined, all literature re-assessed, new causal links included, a framework diagram constructed, and a discussion based around the subject added.

While many studies make mention of how demographic factors might influence environmental behaviour there is no comprehensive or simple framework for locating them. Publications for review were selected primarily by searching the commonly used academic search engines Scopus, Web of Knowledge and JSTOR using a mix of key words that included age, gender, experience, education, agri-environment, farming (farmer), and demographic. Where mention of hypothesised causal influence was made in a publication the original references were traced back where possible.

Despite the existence of a wider literature covering economically developing countries, this review focuses on agriculture in advanced economies. While similarities cannot be discounted, many developing economies have radically different farming systems, environmental problems, policy environments, education systems, and so on. The majority of studies that emerged from the literature search came from Europe where measures to decrease

the environmental impact of agriculture have been the subject of many assessments. Of the 53 papers found to contain information on the relationship between the demographic variables and environmental behaviour 12 came from North America, 5 from Australasia, 1 from South Africa, and 35 from Europe (mainly the EU). This emphasis on Europe/North America needs to be considered when applying the results of this review outside of the region.

[Table 1](#) summarises the findings of the reviewed literature. The most commonly tested characteristics were age and education – two factors believed to be strongly related to farmers' environmental behaviour. However, the review indicated that in almost 38% of cases no relationship was found between age and environmental behaviour, while for experience, education and gender around 31–33% of results showed no detectable relationship. Explanations of causality were often couched in phrases such as "provided the distinct impression" ([Jay, 2005: 24](#)), "no doubt as a result of" ([Solano et al., 2006: 415](#)), "It is also almost a cliché that" ([Brodt et al., 2006: 100](#)), "it seems reasonable that" ([Ondersteijn et al., 2003: 42](#)), "it could be expected" ([Wilson, 1997: 82](#)), "we speculate that" ([Pannell et al., 2006: 1413](#)), "with an underlying assumption that" ([Riley, 2006: 341](#)), and so on. Thus it is evident that, despite frequently testing these variables and/or employing them to model human behaviour, there is very little certainty as to how these relationships are occurring.

3. Demographic relationships and explanations from the literature

3.1. Age of the owner occupier/manager

The majority of studies examining the relationship between age and environmental behaviour suggest that younger farmers are more likely to undertake programs or environmental enhancements than older farmers (e.g. [Filson, 1993](#); [Bager and Proost, 1997](#); [Bonnieux et al., 1998](#); [Ellis et al., 1999](#); [Vanslebrouck et al., 2002](#); [Mathijs, 2003](#); [Brodt et al., 2006](#); [Siebert et al., 2006](#); [van Rensburg et al., 2009](#); [Boon et al., 2010](#); [Murphy et al., 2011](#)). However, reviews of the literature observe age to be an unreliable indicator ([Rougooor et al. 1998](#); [Pannell et al., 2006](#); [Knowler and Bradshaw, 2007](#)). For example, some studies found no difference between the age of farmers who entered environmental/conservation schemes and those who did not (e.g. [Wilson, 1997](#); [Atari et al., 2009](#); [Siebert et al., 2010](#); [Yiridoe et al., 2010](#); [Finger and Lehmann, 2012](#)) while others have found younger farmers to be less willing participants ([Kristensen et al., 2004](#); [Defrancesco et al., 2008](#); [Barreiro-Hurlé et al., 2010](#)), possibly as a result of their greater enthusiasm for intensive agricultural practices (e.g. [Short, 1997](#); [Burton and Wilson, 2006](#)). Within the literature four main causal explanations have been postulated.

First, the farmer's age reflects the social cohort within which he/she was raised. Cohort effects occur when attitudes and beliefs become fixed to a particular historical social context through education, socialisation, or simply the accumulation of preferences

Table 1
Summary of detected relationships between demographic variables and environmental behaviour in reviewed papers.

	Tested	Relationship	No relationship	Tested but no mention	Not tested
Age	45	26	17	2	8
Experience ^a	15	10	5	2	37
Education	38	25	12	1	14
Gender	15	9	5	1	37

Numbers indicate the number of studies involved (^a One paper tested two environmental behaviours with one result significant and one not significant).

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