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Research paper

Beyond purchasing: Electric vehicle adoption motivation and consistent sustainable energy behaviour in The Netherlands

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ABSTRACT

Adoption of smart energy technologies, such as electric vehicles (EVs), can significantly reduce fossil energy use, provided that adopters of an EV also use the EV in a sustainable way. Hence, it is key to understand which factors affect the likelihood that the adoption of EVs promotes the sustainable use of EVs, and promote consistent sustainable energy behaviours. We argue that the motivation to adopt an EV plays a key role in this respect. When people adopt an EV for environmental reasons, this will signal that they are a pro-environmental person, thereby strengthening environmental self-identity and promoting consistent sustainable energy behaviours. We conducted two cross-sectional studies among EV adopters to test our reasoning. As expected, the more people adopted an EV for environmental reasons, the stronger their environmental self-identity, in turn increasing the likelihood that they engaged in other sustainable energy behaviours. In contrast, adopting an EV for financial or technological reasons was not consistently related to environmental self-identity and sustainable energy behaviours. These results suggest that the motivation for adopting an EV is crucial for the likelihood that people engage in sustainable energy behaviour consistently, which is key to realise a sustainable energy transition.

1. Introduction

People increasingly adopt smart energy technologies, such as photovoltaic solar panels and electric vehicles (EV), to produce, use and store energy from renewable sources [1,2]. Smart energy technologies can significantly reduce fossil energy use and emissions of greenhouse gases provided that people not only accept and adopt such technologies [3,4], but also use them in a sustainable way [5]. For example, the CO_2 emission reductions achieved by driving an EV rather than a car with an internal combustion engine will be much larger when the EV is charged with energy produced from renewable energy sources rather than by a coal-fired power plant [6]. Yet, people typically charge EVs in the early evening, thereby increasing peak electricity demand [7]. Power plants often use fossil fuels to meet such peak demand, resulting in higher CO_2 emissions [8,9]. In addition, charging EVs at peak times can threaten grid stability and reliability [10].

Hence, the adoption of smart energy technologies such as EVs is important but not sufficient to realise a sustainable energy transition; people need to use the EVs in a sustainable way and more generally, consistently engage in a wide range of sustainable energy behaviours [3]. In this paper, we aim to examine which factors affect the likelihood that the adoption of EV results in sustainable use of the EV as well as engagement in a wide range of sustainable energy behaviours.

1.1. Which factors affect whether EV adoption encourages other types of sustainable energy behaviour?

Several studies have examined so-called spillover-effects, reflecting the extent to which engaging in one sustainable energy behaviour affects the likelihood of subsequent sustainable energy behaviours (Refs. [11,12], for reviews). Some studies suggest that engagement in one sustainable energy behaviour does not necessarily motivate people to engage in other types of sustainable energy behaviour as well [13,14]. In fact, performing a sustainable energy behaviour may even reduce the likelihood to act sustainably in subsequent situations (negative spillover effects; Tiefenbeck et al., 2013). It has been argued that negative spillover effects are likely when people feel licensed to act immorally (such as not engaging in sustainable energy behaviour) after engaging in behaviour that is seen as morally good (such as adopting an EV; Nilsson et al., 2017).

Yet, various studies report positive spillover effects, where engagement in initial sustainable energy behaviour increases the likelihood that people engage in other sustainable energy behaviours as well. For example, a qualitative study revealed that people who adopted an EV indicated to engage in other types of sustainable energy behaviour as well [16]. Notably, people are more likely to consistently engage in sustainable energy behaviour when the initial sustainable

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Table 1
Socio-demographic characteristics of respondents Study 1.

Highest completed level of education		Net income of one's household per month	
Primary school	4.1%	Less than 750€	1.4%
Pre-vocational secondary education	2.7%	Between 750€–1.500€	1.4%
Secondary vocational education	13.5%	Between 1.500€–2.250€	0%
Senior general secondary education	8.1%	Between 2.250€–3.000€	4.1%
Higher professional education/Pre-university education	29.7%	Between 3.000€–3.750€	12.2%
University education	41.9%	Between 3.750€–4.500€	14.9%
		More than 4.500€	52.7%
		Not willing to indicate	13.5%

energy behaviour strengthens their environmental self-identity [17,18]. Environmental self-identity reflects the extent to which you see yourself as a type of person who acts environmentally-friendly [19]. Environmental self-identity is likely to be strengthened when people realise they acted in a sustainable way in the past, which in turn promotes other types of sustainable energy behaviour as people are motivated to be consistent and act in line with how they see themselves [17,18].

A key question is which factors affect the likelihood that the adoption of an EV strengthens one's environmental self-identity, in turn promoting the sustainable use of EVs as well as other types of sustainable energy behaviours. We propose that the motivation for EV adoption, that is, the reasons why one adopted an EV, plays a key role in this respect. More specifically, we argue that people will be more likely to use an EV in a sustainable way and to engage in other types of sustainable energy behaviour when they adopted an EV for environmental reasons, as this increases the likelihood that they perceive their choice to adopt an EV was a sustainable choice. More specifically, adopting an EV for environmental reasons will signal that one is a pro-environmental person, thereby strengthening environmental self-identity, which in turn promotes consistent sustainable energy behaviour, including using an EV in a sustainable way. Yet, when people adopt an EV for other reasons, such as financial or technological reasons, they are less likely to perceive their EV adoption as a sustainable choice. In this case, their EV adoption is less likely to signal that they are a pro-environmental person, thereby making it less likely that environmental self-identity will be strengthened and that they will engage in other types of sustainable energy behaviour as well.

Our novel reasoning has not been tested yet. Nevertheless, a few studies provide circumstantial evidence for parts of our reasoning. First, research suggests that engaging in behaviour that clearly benefits the environment strengthens one's environmental self-identity. For example, when people receive feedback showing that they acted in a sustainable way in the past, their self-concept and environmental self-identity was boosted [20,21]. This suggests that people are more likely to perceive themselves as a pro-environmental person when they realise that their behaviour is sustainable. We argue that people are more likely to think that their behaviour is sustainable when they engaged in the behaviour for environmental reasons.

Second, research suggests that engagement in sustainable energy behaviour is particularly likely to strengthen environmental self-identity when people did not perform the behaviour because of external factors. For example, environmental self-identity is particularly strengthened when people engage in sustainable energy behaviour that is rather unique or difficult [17] and when they voluntarily engaged in the behaviour [21]. These findings are in line with our reasoning. When sustainable energy behaviour is unique, difficult or voluntary, it is more likely that people think they acted sustainably for environmental reasons rather than some other factor (e.g. because there was no other option, or it was the most easy or cheap option), which makes it more likely that environmental self-identity is strengthened.

Third, research suggests that emphasizing the environmental benefits of a given behaviour (such as CO_2 -emission reduction) is more likely to promote other sustainable energy behaviour compared to emphasising the financial benefits of the relevant behaviour (such as savings in Euro; [13,22]). Similar results were found when financial costs of behaviour actually changed: a small financial charge on plastic bags motivated people to bring their own shopping bags, but it did not significantly encourage engagement in other types of sustainable energy behaviour [14]. These findings are in line with our reasoning that engagement in sustainable energy behaviour for environmental reasons promotes consistent sustainable energy behaviour.

1.2. The present studies

Although the studies discussed above are in line with parts of our reasoning, they did not examine whether and why motivation to engage in one sustainable energy behaviour, such as adoption of an EV, affects the likelihood of consistent sustainable energy behaviour. More specifically, the question remains whether the motivation to adopt an EV affects the likelihood of consistent sustainable energy behaviour, including the sustainable use of an EV, because of the implications of this motivation for environmental self-identity. We conducted two cross-sectional studies among EV adopters to examine whether motivation to adopt an EV is likely to affect sustainable use of the EV as well as engagement in a wide range of sustainable energy behaviours. We expected that the more people adopted an EV for environmental reasons, the more likely the EV adoption is to signal that one is a pro-environmental person, thereby strengthening environmental self-identity and promoting consistent sustainable energy behaviour, including sustainable use of an EV (Hypothesis 1). In contrast, the more people adopt an EV for other reasons than the environment (in our studies: financial and technological), the less likely this EV adoption is to signal that one is a pro-environmental person, making it less likely that environmental self-identity will be strengthened and consistent sustainable energy behaviour will be promoted (Hypothesis 2).

2. Study 1

2.1. Method

2.1.1. Participants and procedures

Participants were recruited online via Dutch fora and Facebook pages devoted to EVs between October and December 2015. We used one inclusion criterion: people needed to possess an EV. In total, 112 people started the questionnaire, of which 74 completed the questionnaire (71 males; M_{age} = 46.01, SD_{age} = 9.91). Our sample comprised mainly men who were relatively highly educated and had a relatively high income (Table 1), which is typical of early adopters [23], and particularly adopters of an EV [24].

2.1.2. Measures

2.1.2.1. Adoption motivation. Participants rated the importance of three types of motivation for their decision to adopt an EV: environmental, financial and technological. The items were adapted from previous research [25,26]. Respondents indicated how important environmental, financial, and technological reasons, respectively, were in their decision