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One model to predict them all: Predicting energy behaviours with the norm activation model

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ABSTRACT

One of the most influential models explaining how and which (normative) factors influence environmental behaviour is the norm activation model (NAM). In support of the compatibility principle, research revealed that the NAM predicts behaviour best when all variables are measured on the same level of specificity. Yet, at the same time such approaches imply that the predictive power of the NAM would be limited, as behaviour-specific conceptualisations of the NAM variables only predict the behaviour being studied, but not other, related behaviours. We propose that it is important to understand if a general conceptualisation of the NAM, focussing on energy use in general, predicts a range of different energy savings behaviours. We indeed found that NAM variables that focus on energy use in general predict a range of different energy behaviours in different domains, including energy use in the house, for transport and for food, which reflect direct as well indirect energy use. Our results have important implications for policy makers who aim to promote a wide range of energy-saving behaviours needed to effectively combat climate change.

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1. Introduction

We are facing important environmental problems. Concentrations of greenhouse gas emissions have increased, and as a consequence, the atmosphere and oceans have warmed, snow and ice have melted, and sea level has risen [1]. These increases in greenhouse gas concentrations in the atmosphere are one of the key factors demonstrating that humans influence the climate system [1]. The social sciences are needed to overcome these problems [2,3]. Household energy use is an important contributor to the emission of greenhouse gases [4]. Hence, to reduce environmental problems it is important that households reduce their energy consumption. In addition, social sciences can provide important insights into ways to increase the effects and acceptability of policies that aim to promote energy savings [5].

To develop effective strategies to encourage energy savings in households it is important to understand which factors influence household energy consumption. Reducing energy use often involves a conflict between one's own interests and the collective interest. For example, showering shorter is beneficial for the

environment, but may reduce comfort. Similarly, adopting an efficient driving style may be environmentally-friendly but can be a hassle or less pleasurable. What motivates people to reduce their energy consumption even if it is somewhat inconvenient? Studies have shown that normative considerations play an important role in predicting energy savings (e.g., [6,7]). Normative considerations imply that people prioritise collective interests over their self-interest. One of the most influential models that explains how and which normative considerations affect (environmental) behaviour is the norm activation model (NAM; [8]). According to the NAM, people are more likely to reduce their energy consumption when they feel morally obliged to do so, in other words, when they experience a strong personal norm to save energy. A strong personal norm implies that people are intrinsically motivated to act pro-environmentally, even though this may be somewhat costly, because doing so makes them feel good about themselves [9]. Yet, when behaviour is very difficult or costly, people are less likely to act upon their personal norms [47].

The NAM proposes that two factors affect whether personal norms are activated, which encourage energy saving actions. First, people should be aware of the environmental problems caused by energy use (awareness of consequences). That is, they should acknowledge that high energy consumption leads to environmental problems such as climate change. Second, people should have the feeling that they can help to reduce or solve these problems by

changing their behaviour (outcome efficacy). That is, they should realise that environmental problems will decrease if they would reduce their energy consumption.[1]

Experimental and correlational studies have shown that one should first be aware of environmental problems caused by energy consumption, and that a higher problem awareness in turn strengthens the extent to which one thinks one can successfully contribute to the solutions of these environmental problems. Such outcome efficacy in turn activates one's personal norms to reduce energy use. Finally, these feelings of moral obligation lead to energy saving actions [10,11]. This research suggests that policies aimed to promote energy savings should increase people's awareness of consequences of their energy behaviour and their outcome efficacy, which in turn should strengthen personal norms to act pro-environmental and thus promote energy saving actions [11].

Typically, studies measure the variables of the NAM on the same level of specificity as the dependent variable. For example, Harland and colleagues [12] found that awareness of negative environmental consequences of not closing the faucet, feeling responsible for environmental problems due to not closing the faucet, and a felt moral obligation to close the faucet predicted one's intention to close the faucet. Similarly, behaviour-specific conceptualisations of the NAM variables have been found to predict yard burning [13], recycling [14,15], subway use [16], the acceptability of travel demand management measures aimed to reduce private car use [17], using other modes of transport than the car [12], acceptability of energy policies, acceptability of transport pricing policies, willingness to take action to reduce emission of particulates in the city [11], car use [18], the intention to reduce car use and the acceptability of policies aimed at doubling of costs of car use [19], and electricity saving at work [46]. Measuring the variables of the NAM at the same level of specificity as the dependent variables is in line with the compatibility principle [20], which states that variables predict behaviour best when they are all measured on the same level of generality or specificity (see also [11]).

Yet, from a practical point of view, one may not only be interested in which behaviour specific factors predict specific behaviours, but practitioners would like to know whether we can identify general factors influencing many specific behaviours at once. After all, to effectively mitigate climate change, people would need to engage in a wide range of energy saving behaviours that together would substantially reduce CO_2 emissions. Behaviour-specific approaches would imply that policies should aim at increasing awareness of consequences and outcome efficacy with regard to all specific behaviours one aims to change. For example, if the aim is to reduce car use, people should be made aware of the environmental problems caused by car use to increase their awareness of consequences of these problems. Also, they should be informed about how they can contribute to reducing these problems as to increase their feelings of outcome efficacy. However, although such a campaign may be successful in reducing car use, it is not likely to influence other energy saving actions that are needed to substantially reduce energy-related problems such as global climate change as well. If one would also like to promote, for example, shorter showering times, a new campaign needs to be developed to increase people's awareness of consequences

and outcome efficacy with regard to showering. Although modern technologies may make it possible to design many different campaigns that address each energy saving action separately, and tailored information can be provided to somewhat reduce information overload among individuals and households [21], people may lose interest and no longer pay attention to campaigns when they encounter different campaigns targeting different behaviours over and again. Consumers may experience information overload and therefore no longer pay attention to the information (e.g., [22,23]). Another potential disadvantage of behaviour specific campaigns may be that they are less likely to spread to other, related, behaviours. For example, a campaign calling for people to switch off their lights may be effective in doing so [24], but would it also influence other energy saving behaviours such as reducing showering time or car use? It can be expected that spreading to other behaviours will be more likely to occur when campaigns address general motivational factors underlying a range of energy saving actions (cf. [25,26]).

Hence, from a practical point of view, it is important to examine whether general factors influencing energy saving behaviours can be identified. These general factors could then be targeted to promote the adoption of a wide range of energy saving actions needed to substantially reduce significant environmental problems caused by energy use, including global climate change. Is it possible to identify key factors that may influence a range of energy saving actions at the same time? Will the NAM still be predictive of specific energy use behaviours when the key variables are conceptualised at a more general level, reflecting awareness of environmental problems due to energy consumption in general and the extent to which people feel they can help solve these problems by saving energy (i.e., outcome efficacy)?

A few studies conceptualised the NAM on a general level, but in this case the dependent variable was an aggregate measure of pro-environmental or energy use behaviour rather than specific behaviours. Again, this is in line with the compatibility principle, with the NAM and the dependent variable conceptualised on a general level. For example, it was found that general awareness of the consequences of environmental pollution and general personal norm to relieve environmental problems predicted aggregate measures of pro-environmental actions [27–29], general willingness to sacrifice (e.g., to pay higher prices to protect the environment), a composite measure of environmental citizenship [29], and general pro-environmental behaviour intention [30]. These studies thus suggest that conceptualising the NAM on a general level with regard to environmental problems can predict aggregate measures of pro-environmental actions. However, the question remains whether general conceptualisations of the NAM variables would also predict a range of specific energy behaviours separately. This is an important question, as it reveals under which conditions general antecedents do or do not predict a wide range of specific actions. For example, perhaps the NAM only predicted the easy behaviours in a composite scale, such as recycling different types of products or encouraging friends to do so, but not the more difficult behaviours with a high environmental impact, such as using other modes of transportation than the car (cf. [29,31]). Studies by Gärling and colleagues [30] and Stern and colleagues [29] also included dependent variables on a general level and relatively easy behaviours such as the intention to act pro-environmental, willingness to pay more to protect the environment and environmental citizenship. An important remaining question is thus to what extent a general conceptualisation of the NAM predicts specific behaviours separately, including energy saving behaviours that may be perceived as rather difficult, costly or inconvenient. One study provided initial evidence that a general conceptualisation of the NAM, in this case focussing on

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[1] We focus on outcome efficacy and not on ascription of responsibility as empirical studies have shown that ascription of responsibility and personal norm strongly correlate and are difficult to distinguish empirically [16]. Therefore, it has been suggested that studies could best focus on outcome efficacy when studying collective environmental problems (such as energy consumption; [11]).