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**Influencing green behaviour through environmental goal-priming: The mediating role of automatic evaluation**

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## Highlights

- We examined the evaluative and behavioural effects of environmental goal-priming.
- Environmental goal-relevant stimuli were loose versus packaged products.
- Environmental goal-priming influenced automatic evaluation.
- Environmental goal-priming increased choices of loose products.
- Automatic evaluation change mediated the observed behaviour change.

**Abstract** (word count 149)

Understanding how pro-environmental messages may influence behaviour is key to promoting sustainable consumer choice. Research suggests that people automatically evaluate objects as a function of their instrumentality to satisfying active goals. We hypothesized that priming an environmental-protection goal through exposure to a pro-environmental message would produce more positive automatic evaluations and lead people to make the pro-environmental choice of selecting loose rather than packaged products in a hypothetical choice task. As predicted, those primed with an environmental-protection goal automatically evaluated loose products more positively and selected more loose consumer products than a control group. Increased implicit positivity towards loose products mediated the observed behaviour change. Crucially, the effect of environmental goal priming on choices or implicit attitudes towards packaging was not contingent on existing environmental attitudes. Our findings suggest that pro-environmental messages could induce more environmentally friendly consumer choice by leading people to evaluate readily available goal-relevant stimuli positively.

*Keywords:* Environment; goal priming; consumer behaviour; automatic evaluation; implicit attitudes; environmental behaviours.

## 1. Introduction

In response to global environmental problems such as climate change, biodiversity losses and resource shortages, policymakers are increasingly interested in encouraging people to adopt more sustainable behaviours. The UK were the first country to introduce a long-term framework for mitigation and adaptation under the 2008 Climate Change Act (HM Government, 2008), which stipulates an 80% reduction in UK emissions relative to 1990 levels by 2050. While technological innovations such as renewable energies, nuclear power and CO<sub>2</sub> capture and storage have been earmarked by policymakers as potential solutions (de Coninck, Fischer, Newell & Ueno, 2008), in the absence of wide scale behaviour change, such targets are unlikely to be realised (Chapman, 2007). This is partially because any technologically attributed gains in energy saving tend to be offset by consumption growth (Midden, Kaiser & McCalley, 2007). Human choice is therefore key to reducing emissions and producing sustainable consumption patterns.

### *1.1. Behaviourally based solutions*

Behaviourally based changes have the potential to produce quick and cost-effective reductions in carbon emissions (Behavioural Insights Team, 2011). Yet, attempts to enhance pro-environmental behaviour and to capitalise on favourable consumer attitudes are often met with limited success (Whitmarsh & O'Neill, 2010). A likely reason for this is that whilst people hold positive attitudes towards protecting the environment and intend to engage in pro-environmental behaviours, their attitudes and intentions do not align closely with their actual behaviour (e.g., Bamberg & Möser, 2007; Nigbur, Lyons & Uzzell, 2010).

Understanding the disconnect between explicitly stated intentions to protect the environment (stated preferences) and actual behaviour (revealed preference) is key to developing effective pro-environmental policies. One explanation for this disconnect is that despite looming large

during attitude surveys, the salience of environmental goals may be undermined by other more proximal goals and subsequently diminish over time. For example, an intention to reduce packaging consumption may lapse when the supermarket is about to close and grabbing a pre-packaged bag of carrots or apples is the faster option. The notion that competing motivations may undermine long-term goals is supported by theories about temporal constraints on goal-directed behaviour.

### *1.2. Goal activation*

As described in temporal construal theory (Liberman & Trope, 1998), competing motivations evolve and change over time with short-term goals often acting to undermine long-term goals. This is because we tend to process temporally distant events abstractly, whereas proximal events are construed in more concrete terms. Hence, while environmental considerations receive heavy weighting when contemplating decisions about future events (e.g., future purchase decisions during environmental attitude surveys), other motivations may more heavily guide behaviour during decision-making for proximal events, e.g., monetary constraints or a product's functional, rather than environmental, characteristics (Gupta & Sen, 2013). Similarly, theories on goal-gradients propose that the strength of goal activation increases as a function of physical (e.g., Hull, 1932) or temporal (Markman & Brendl, 2000; Lewin, 1935) proximity to the goal, suggesting that short-term goals may undermine long-term goals. Therefore, people may struggle to satisfy long-term, abstract environmental goals that compete with more strongly active proximal goals (Markman & Brendl, 2000).

This study suggests that whilst long-term pro-environmental goals tend to lose out to, and be overruled by salient short-term goals, goals can be reactivated by exposure to goal relevant cues, producing behaviour in line with the goal. It is well established in social psychological research that goals can be activated consciously and nonconsciously, and

operate automatically to guide behaviour, perceptions and judgements (Förster, Liberman, & Friedman, 2007). Goal activation effects have been observed across multiple domains. For example, in the domain of health, implicitly activating a thinness goal through subliminal exposure to the words 'thin,' and 'small,' caused participants to consume fewer cookies (Ferguson, 2007). It follows that exposing people to cues which activate pro-environmental goals could lead to more environmentally sustainable behaviour.

Evidence regarding the activation of environmental goals is currently lacking. However, the notion that motivational constructs can be experimentally activated which produce environmental behaviour is supported by research on priming environmental values. Verplanken and Holland (2002) found that priming environmental values increased hypothetical choices of environmentally friendly televisions. Value-congruent behaviour occurred only as a function of priming; participants for whom environmental values were central to the self did not behave in line with their values unless these were activated, suggesting that environmental motivations require cognitive activation in order to influence behaviour. Similarly, Biel, Dahlstrand and Grankvist (2005) enhanced the salience of environmental values through exposure to a poster, increasing choices of green product alternatives in a computer-simulated supermarket.

### *1.3. Value and goal activation*

Values, similarly to goals, are conceptualised as motivational constructs. They are often described as 'higher order' or 'abstract' goals that serve as guiding principles in life (Rokeach, 1973; Schwartz, 1992). Goals are conceptualised as cognitive representations of a desired endpoint which people strive to attain (Bargh, Gollwitzer, Lee-Chai, Barndollar and Trotschel, 2001; Kruglanski et al., 2002). Thus, one difference between values and goals is their level of specificity. Because values are general principles that transcend situations (Schwartz, 1992), it has been claimed that they are often further away from behaviour than



goals (Jolibert & Baumgartner, 1997), which are more specific in their construal, comprising behavioural plans, knowledge and evaluations (Kopetz, Kruglanski, Arens, Etkin & Johnson, 2012; Kruglanski et al., 2002). While people strive to attain or satisfy goals, values ‘guide’ behaviour but are not pursued or attained.

Value activation manipulations typically involve providing cues to activate the abstract representation of the value, i.e., ‘the environment.’ For example, Verplanken and Holland (2002) exposed participants to environmental values in an impression formation task, and words semantically related to the environment (e.g., ‘green’ and ‘nature’) in a scrambled sentence task. Similarly, Biel et al., (2005) exposed participants to a poster of a cow in a field, activating the mental representation of ‘nature’. Like values, goals can be primed through exposure to cues which activate their abstract representation (Kruglanski et al., 2002). The similarity of methods used to activate both goals and values (i.e., SSTs, impression formation tasks) can make it difficult to empirically distinguish between these constructs. However, because goals are hierarchically represented, comprising interconnected goals and means (Kruglanski et al., 2002), they can be activated by exposure to lower level means to achieve the goal (i.e., reduce household waste; consume less packaging; Janiszewsk & Van Osselaer, 2012).

We therefore propose that increasing the salience of specific environmental goals during decision-making, thus locating environmental considerations in the ‘here and now’, could assist the attainment of environmental goals, ultimately leading to more environmentally sustainable choices. To ensure that our manipulation was goal rather than value orientated, we used a pro-environmental message which focussed on the specific goal of waste reduction. Thus, rather than activating the abstract concept of the environment, our goal prime stimulus focused on behavioural means to satisfy environmental goals (i.e., waste reduction). Furthermore, we aimed to identify the specific mechanism underpinning the

relationship between goal activation and behaviour, building on research by Ferguson and colleagues (Ferguson, 2008; Ferguson & Bargh, 2004) who have shown automatic evaluation<sup>1</sup> to play a functional role in supporting goal-pursuit.

#### *1.4. Mechanisms linking goal activation and behaviour*

Recent work on goal-pursuit has demonstrated that experimentally activated goals result in temporary changes in the automatic evaluation of objects instrumental to goal attainment (e.g., Ferguson, 2008; Ferguson & Bargh, 2004; Moore, Ferguson, & Chartrand, 2011). Ferguson coined the term “evaluative readiness” to describe this well-documented phenomenon illustrating the malleability of automatic evaluation following goal activation. Conceptually similar to Lewin (1935), who argued that objects were evaluated as a function of their instrumentality to satisfying needs, and Markman’s goal compatibility framework (Markman & Brendl, 2000), evaluative readiness suggests that the automatic evaluation of an object is contingent on the object’s utility to goal attainment. In one demonstration, Ferguson and Bargh (2004) found that when an achievement goal was activated by reading task instructions, participants displayed more implicit positivity towards objects instrumental to satisfying this goal. Similarly, cigarette deprived smokers automatically evaluated smoking paraphernalia more positively than smoking unrelated items (Sherman, Rose, Koch, Presson & Chassin, 2003). However, this effect did not occur for participants who had recently smoked, demonstrating that goal dependent automatic evaluation effects are confined to currently, rather than recently active goals.

Evaluative readiness is proposed to result from the heightened accessibility of positive memories and knowledge structures associated with goal-relevant stimuli (Ferguson, 2008; Ferguson & Bargh, 2004; Moskowitz, 2002). Accordingly, the activation of a goal renders

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<sup>1</sup> The terms “automatic evaluation” and “implicit attitudes” are both commonly used in the literature to describe attitudes that are automatically activated. We use these terms inter-changeably throughout the paper.

positively valenced memories and knowledge associated with objects instrumental to goal attainment more accessible, while inhibiting negative memories towards these same objects (Ferguson, 2008). This claim is supported by research using affective priming paradigms, which find that participants are quicker to respond to positive than negative adjectives when they are preceded by goal-relevant target words (Custers & Aarts, 2007; Ferguson, 2008), suggesting that positive object information is more easily accessible. The assumption underpinning this research is that positively evaluated stimuli are more likely to be approached (Chen & Bargh, 1999; Fitzsimons & Shah, 2008). Hence, increased implicit positivity towards goal-relevant objects facilitates goal pursuit by directing people towards objects in the environment that will help attain the goal. From this perspective, automatic evaluation serves a functional role in goal-regulation.

### *1.5. Study overview*

Though goal priming effects are widespread, to our knowledge there exists no evidence to date regarding whether environmental goals can be experimentally activated, nor whether activation of specific environmental goals produces more environmentally sustainable behaviour. Our research has two main goals; firstly, we sought to identify whether activating an environmental goal by exposure to goal-relevant information would produce more environmentally friendly choices. While environmental goals can be attained through multiple means, we focus on activating the specific environmental goal of waste reduction. Thus, to ensure specificity of the environmental goal, the goal prime focused on environmental problems associated with domestic waste. Because packaging contributes largely to the waste problem, accounting for 30% of municipal solid waste in the US (EPA, 2011), and 20% in the UK (Defra, 2011), goal-relevant objects were loose versus packaged products. If goal priming effects did emerge, it would be interesting to explore whether such

effects were contingent on participants existing pro-environmental orientation, thus measures of environmental attitudes were also included. Secondly, building on the existing “evaluative readiness” literature (Ferguson, 2008; Ferguson & Bargh, 2004), we wished to explore the specific mechanism underlying the relationship, and identify whether changes in the automatic evaluation of goal-relevant objects mediate the observed behaviour change. We predicted that automatic evaluations would become more positive towards objects instrumental to satisfying the environmental goal (i.e., loose products), producing an increase in choices of loose products. Consistent with existing research (Ferguson, 2008; Ferguson & Bargh, 2004), we did not expect explicit evaluations to differ as a function of goal priming.

## **2. Method**

### *2.1. Design*

Participants were randomly allocated to an environmental-protection goal priming condition or financial-protection goal priming condition, the latter serving as the control group. Ensuring that both the control and experimental condition were in a motivational state allowed us to rule out whether any between group effects were simply the result heightened motivation (Ferguson, 2008). Dependent variables were automatic evaluations, explicit evaluations and choices between loose and packaged products. The order of presentation of the automatic and explicit evaluation measure was counter-balanced; both measures preceded choice.

### *2.2. Participants*

Eighty students and staff (40 per condition) at the University of Manchester participated in exchange for either a monetary compensation or course credit,  $M_{\text{age}} = 22.56$ , 68% female.

### *2.3. Materials*

### 2.3.1. Goal priming

Goals were explicitly primed using text vignettes ostensibly related to a ‘reading comprehension’ task, developed by the researchers. Each text featured a ‘problem’, eight facts about the causes and consequences of the problem, and five tips to avoid this problem. These materials can be viewed in appendix A. The environmental goal prime focused on the specific goal of waste reduction, describing the causes and environmental impact of growing household waste volumes. To ensure that loose products were viewed as instrumental to satisfying the environmental goal, packaging was explicitly mentioned twice, firstly as a cause of domestic waste and secondly as one method to reduce domestic waste. The neutral goal prime outlined the causes, prevalence and financial impact of identity fraud. This goal prime was considered an appropriate control as it allowed the text to follow the same format as the environmental goal prime, thus ensuring consistency between the conditions. We also believed that the goal to protect ones financial resources is a relatively universal one, and of equal, if not greater importance than the goal of environmental protection, again ensuring consistency between conditions. We used identical wording to introduce the problem discussed in each condition. Each text was approximately 350 words. Materials were pilot tested to ensure that the environmental and financial texts were directly related to their respective goals. We utilized a method similar to Aarts, Gollwitzer & Hassin (2004) who asked participants to state the goal implied by their experimental stimulus, which were also text vignettes. Prior to the current experiment, twenty staff and students in the School of Psychological Sciences at the University of Manchester were presented with the goal prime materials and asked to state the goal implied by each text. Analysis of responses confirmed that in 100% of responses, the environmental goal prime implied the goal of environmental protection (responses such as ‘to reduce waste’ and ‘produce less rubbish’ were included),

whereas the financial goal prime implied the goal of financial protection in 100% of responses.

### *2.3.2. Automatic evaluation measure*

Automatic evaluations towards packaging were measured using an Implicit Association Test (IAT; Greenwald, McGhee & Schwartz, 1998). The IAT is a response mapping task which measures individual association strengths between two bi-polar attribute categories and two bi-polar target categories across four target blocks. Response latency is used as the primary criterion to determine the relative strength of associations between the four categories. The basic rationale underpinning the IAT is simple; “if two concepts are highly associated, the IAT’s sorting task will be easier when the two associated concepts share the same response than when they require different responses” (Greenwald & Nosek, 2001, p.85). The reliability and validity of the IAT has been confirmed by several independent investigations (Cunningham, Preacher & Banaji, 2001; Greenwald, Poehlman, Uhlmann & Banaji, 2009). We utilized the seven-block IAT procedure outlined by Greenwald, Nosek and Banaji (2003). The order presentation of the combined blocks (3 and 4; 6 and 7) was counter-balanced between participants. The right/left location of the target and attribute categories was also counter-balanced. Each category was represented by 10 exemplars. Target categories were ‘loose’ and ‘packaged’, consisting of equivalent images of fruit and vegetables (i.e., broccoli, apples), differing only in the presence or absence of plastic packaging. We selected the category of fruit and vegetables as this represents a consumer product commonly available in packaged and unpackaged form. Attribute categories were ‘good’ (e.g., love, wonderful) and ‘bad’ (e.g., hate, terrible) words.

### *2.3.3. Explicit evaluation measure*

Explicit evaluations were assessed using an 11-point rating scale anchored by the statements 'I strongly prefer loose/packaged fruit and vegetables'. The scale displayed strong test re-test reliability over a three-week interval ( $N=20$ ),  $r=0.95$ .

#### 2.3.4. Environmental attitude scales

We used the New Ecological Paradigm Scale (NEP) (Dunlap, Van Liere, Mertig & Jones, 2000) and a short version of the Environmental Attitudes Inventory (EAI-24) (Milfont & Duckitt, 2010) to measure environmental attitudes. The NEP is a general measure of pro-environmental orientation encompassing beliefs, attitudes and values (Dunlap et al., 2000). Despite not being rooted in social psychological attitude theory, the NEP is the most widely used measure of environmental attitudes across several cross-cultural populations (Hawcroft & Milfont, 2010). The NEP contains 15 items measured using a five-point scale ranging from *strongly agree* to *strongly disagree* (seven items reversed scaled). Example questions include "humans are severely abusing the environment" and "humans were meant to rule over the rest of nature" (reverse scaled). Cronbachs alpha of the scale was .70.

Although it is the most widely used environmental attitude scale, the NEP is arguably not a pure measure of environmental attitudes. Hence we also included the Environmental Attitudes Inventory (EAI; Milfont & Duckitt, 2010). The EAI is a more recently developed scale measuring multi-dimensional environmental attitudes. Scale items all correspond to one of two underlying constructs, preservation and utilization. The former refers to the belief that preserving nature should be prioritised (e.g., "humans are severely abusing the environment"), whilst the latter refers to the opposing belief that nature can be utilised for human use (e.g., "human beings were created or evolved to dominate the rest of nature"). We used a shorter version of the scale (EAI-24) and computed a general environmental attitude

score by reversing the utilization items and then averaging the responses to all 24 items (Milfont & Duckitt, 2010). Cronbachs alpha of the scale was .77.

#### *2.3.5. Behavioural measure*

We measured behaviour using a hypothetical computer based choice task. Participants viewed 35 pairs of images on a computer screen and selected which item they would purchase from each pair using a corresponding computer key. Twenty target pairs and 15 filler pairs were presented in a randomised order. Each target pair consisted of equivalent loose and packaged versions of a fruit or vegetable product (e.g., pears; potatoes). The on-screen location (right or left) of the packaged and loose items was counter-balanced within participants. Filler pairs consisted of two similar consumer food or drink products, e.g., two different brands of orange juice, or equivalent organic and non-organic products. A 500ms fixation point in the centre of the screen, followed by a 250ms blank screen, preceded each pair. Participants had unlimited time to select their choices.

#### *2.4. Procedure*

Participants were informed that the research aimed to examine how decision-making can influence the ability to retain previously learnt information. Participants were first presented with the goal prime materials, described as a 'reading comprehension' task. No time limit to read the materials was imposed. They then completed the implicit and explicit attitude measure in a counter-balanced order, followed by the choice task. For this task, participants were instructed to imagine shopping in a supermarket, that they would view several product pairs, and that their task was to select their preferred product by pressing a corresponding computer key. No time limit to select their choices was imposed. Participants next completed the environmental attitude scales, which were presented in a counter-balanced order. The IAT, choice task and environmental attitude scales were administered



electronically using E-Prime 1.2 software (Psychology Software Tools, Pittsburgh, PA). The explicit attitude scale was completed using pencil and paper. Finally, participants completed a funnelled debriefing procedure (adapted from Chartrand & Bargh, 1996) to ascertain their awareness of the study aim and influence of the goal priming materials. Example questions include; “what do you think the purpose of the experiment was?”; “do you think that any of the tasks were related?”; “did your performance on one task affect your performance on another task?”

### 2.5. *Statistical analysis*

The percentage of loose items selected was used as an index of participants' choice behaviour. We calculated IAT scores according to the D2 algorithm outlined in Greenwald et al., (2003). Positive values indicated preferences towards loose products, while negative values indicated preferences towards packaged products. D scores represent an effect size similar to Cohen's  $d$  (Cohen, 1988) with small, medium and large effect sizes quantified as 0.2, 0.5 and 0.8, respectively. Between-participant comparisons were analysed using independent  $t$ -tests.

#### 2.5.1. *Mediation Tests*

Mediation analysis was performed to determine whether the effect of goal priming on choice behaviour was mediated by changes in automatic evaluation. We performed the mediation analysis using Hayes' (2012) PROCESS macro (model 4, Hayes, 2012). This method uses non-parametric bootstrapping analyses to test the indirect effect of implicit attitudes as a mediator of the relationship between goal priming (IV) and choice behaviour (DV). The statistical technique of bootstrapping resamples the data to ensure that it is more representative of the population (Preacher & Hayes, 2004, 2008). As such, non-parametric bootstrapping analysis is recommended in smaller samples and does not make any assumptions about the shape of the sampling distribution of the indirect effect (Preacher &

Hayes, 2008; Zhao, Lynch & Chen, 2010). The current study used 10,000 bootstrapped samples with a 95% confidence interval. Within this analysis, evidence for mediation is obtained if the bias-corrected bootstrapped 95% confidence intervals exclude zero (Preacher & Hayes, 2008; Zhao et al., 2010). As the IV was categorical and dichotomous, we recoded the financial and environmental goal priming conditions as -1 and +1, respectively.

### 2.5.2. Moderation tests

Moderated multiple regression analysis was performed to determine whether environmental attitudes, as measured by the NEP and EAI-24, moderated the strength of the relationship between goal priming and implicit attitudes or choice behaviour. This analysis was also performed using the PROCESS macro (Model 1, Hayes, 2012). Within this method, all continuous predictor variables are mean centred prior to analysis. An interaction term is then created by multiplying the centred predictor variables. The macro performs a series of OLS regression analyses to determine whether the interaction term increases the portion of variance explained in the outcome variable. Evidence for moderation is obtained if the addition of the interaction term significantly accounts for an increase in  $R^2$  (Hayes, 2012).

## 3. Results

Table 1 outlines the descriptive statistics for the dependent variables. Choice behaviour and automatic evaluations significantly differed as a function of goal priming. Environmental goal primed participants selected a significantly greater percentage of loose items (65%) compared to control participants (50%)  $t_{(78)} = 2.04, p < .05, d = .45$ . Implicit attitudes were significantly more positive towards loose items for participants primed with an environmental-protection goal (.39) compared to a financial-protection goal (.18)  $t_{(78)} = 2.30, p < .05, d = .52$ . As anticipated, explicit evaluations did not differ as a function of the goal prime  $t_{(78)} = 0.38, p = .709$ . These were 6.38 versus 6.60 for the environmental and financial goal prime, respectively.

### 3.1. Mediation tests

Results based on 10,000 bias-corrected bootstrapped samples indicated that the total effect of goal priming on choice behaviour was significant ( $b = 7.69, p = .045$ ), with automatic attitudes explaining 42% of the relationship between the goal prime and choice. The direct effect of goal priming on choice behaviour with the mediator included in the model was non-significant ( $b = 4.51, p = .221$ ). This was qualified by a significant indirect effect as evidenced by the bias-corrected 95% confidence intervals which excluded zero ( $b = 3.17, bootlegged SE = 1.57, 95\% CI = .71 \text{ to } 7.10, p < .05$ ), indicating mediation (Preacher & Hayes, 2004). As displayed in Table 2, after accounting for the indirect effect, the relationship between goal priming and choice behaviour is non-significant. Additionally, the variance explained in choice behaviour is significantly greater (5% to 18%) when the mediator is entered in block 2 of the hierarchical regression equation ( $F_{(2,77)} = 8.27, p = .001$ ). This pattern of results suggests that, as predicted, increased implicit positivity towards loose products in response to environmental goal priming mediated the corresponding behaviour change, producing an increase in the selection of loose consumer goods.

### 3.2 Environmental attitudes

Mean NEP values were 55.60 (SD = 5.79) and 54.10 (SD = 7.55) for the environmental and financial priming conditions, respectively. These values did not significantly differ between conditions  $t_{(78)} = 1.00, p = .332$ . Mean EAI-24 values were 4.69 (SD = .65) and 4.83 (SD = .77) for the environmental and financial priming conditions, respectively. Again, these values did not significantly differ between conditions  $t_{(78)} = -.90, p = .369$ .

### 3.3. Moderation tests

We performed separate moderation analyses for each potential moderator (NEP, EAI-24) on implicit attitudes and choice behaviour, thus a total of four moderation analyses were computed. In each analysis, goal priming condition was entered as the predictor variable and dummy coded as outlined in section 2.5.1. Outcome variables were either implicit attitudes, or choice behaviour. The regression coefficients for each moderation analysis can be seen in Table 3. In each analysis, there was no significant increase in  $R^2$  as a function of the interaction term ( $ps > .05$ ). This indicates that the effect of goal priming on both implicit attitude change and choice behaviour was not moderated by existing environmental attitudes, as measured by both the NEP and EAI-24.

### *3.4 Funnelled debriefing*

No participant reported being influenced by the goal prime materials and no participant guessed the study aim.

## **4. Discussion**

We first investigated whether activating the environmental goal of waste reduction through exposure to a pro-environmental message would increase hypothetical choices of loose versus packaged consumer products. Second, we examined whether changes in the automatic evaluation of objects instrumental to attaining the environmental goal mediated the corresponding behaviour change. Our results support both predictions. Participants primed with an environmental goal selected a significantly greater proportion of loose products in a hypothetical choice task compared to a control group. Further, increased implicit positivity towards loose products mediated the effect of goal priming on choice. These findings support the notion that we become “evaluatively ready” to pursue our goals (Ferguson, 2008) and provide evidence for automatic evaluation as the mechanism through which goals influence

behaviour, thus contributing to existing research on the goal-dependent nature of automatic evaluation.

Consistent with Ferguson and Bargh (2004) and Ferguson (2008), we found that while automatic evaluations differed as a function of goal priming, explicit evaluations did not. Attitude theorists have traditionally conceptualised explicit evaluations as unstable, context dependent constructs influenced by recent experiences, while implicit evaluations are relatively stable constructs unaffected by context or motivation (e.g., Wilson, Lindsey & Schooler, 2000). The present findings, combined with existing evaluative readiness research, which show the malleability of automatic but not explicit evaluations in response to contextual and motivational factors, challenge this traditional view. One suggestion regarding why automatic, but not explicit evaluations are sensitive to goal pursuit is that people are biased by their own reasoning. Models of explicit - implicit relations (e.g., Gawronski & Bodenhausen, 2006) propose that, upon reflection, people may reject their initial evaluations based on momentary considerations; subsequent evaluative judgements may thus be entirely independent of initial automatic evaluations. By contrast, properties of automatic evaluations means they are likely to automatically and rapidly appraise environmental stimuli before reflective strategies are employed, and are thus more sensitive to internal motivational states (Chen & Bargh, 1999; Ferguson, 2008).

Importantly, we found that goal priming produced more environmentally friendly choices independently of environmental attitudes, as measured by both the NEP and EAI-24. Priming is known to influence behaviour by activating an existing mental structure (Bargh et al., 2001). The finding that environmental attitudes did not moderate the relationship between environmental priming and choice indicates that the prime did not simply reactivate existing environmental attitudes, lending support to our assumption that a motivational construct was

activated. An alternate explanation for the null effect of environmental attitudes is that environmental attitudes measured in the current study were not reliable. We reject this explanation for two reasons. First, both environmental attitude scales displayed acceptable alpha levels in our sample. Second, while one may question whether social desirability motivations influenced the reporting of environmental attitudes, research has shown that social desirability only weakly influences responses on environmental attitude surveys, failing to moderate the attitude-behaviour relationship (Milfont, 2009). It is also possible that people with more extreme environmental attitudes than the current sample, i.e., who do not value the environment, are not influenced by such manipulations. It would be useful to further explore the individual differences that moderate the effect of environmental goal priming manipulations in future research.

#### *4.1. Priming environmental goals*

Our experiment provides the first evidence that activating environmental goals through the provision of goal-relevant information influences environmental choices through changes in the automatic evaluation of goal-relevant stimuli. Activating an environmental-protection goal produced more positive automatic evaluations to unpackaged relative to packaged products were automatically evaluated more positively, which increased choices of these products. Our results suggest that heightening the salience of environmental goals through exposure to goal-relevant information, such as a pro-environmental messages, may facilitate the satisfaction of environmental goals, leading consumers to choose the greener option. Reminding participants about the environmental implications of domestic waste prior to decision-making produced a significant reduction in the selection of packaged products compared to a control group. While recycling represents one method to minimise environmental harm from waste, the environmental benefits of absolute waste prevention

exceed that of re-use and recycle. Moreover, studies have demonstrated that the introduction of recycling bins increases consumption levels compared to when recycling facilities were not available (e.g., Catlin & Wang, 2013), suggesting that recycling availability may justify higher consumption. Reducing packaging may thus ameliorate absolute packaging consumption compared with recycling alone.

We observed a moderate effect of goal activation on both implicit attitudes and choice behaviour, with implicit attitude change evidencing a slightly larger effect. This result is unsurprising given that implicit attitudes mediated the behaviour change. The moderate effect size compares favourably to other priming research; meta-analyses of priming research have typically observed small ( $d = 0.35$ ; DeCoster & Claypool, 2004) to moderate effects ( $d = 0.45$ ; Oyserman & Lee, 2008). Our results also compare favourably to other (self-reported) behaviour change research. A meta-analysis of 47 studies (Webb & Sheeran, 2006) revealed that interventions targeting health and social behaviours produced on average only a small effect on self-reported behaviour ( $d = .36$ ).

One consideration is whether the behavioural effect resulted from the activation of a specific goal or a more abstract environmental value<sup>2</sup>. We believe that both the manipulation and its effect support goal activation. First, the goal prime activated the specific goal of waste reduction (a means to achieve wider environmental goals), rather than the general value of protecting the environment. Second, evaluative readiness, as observed in the current study, is a unique feature of goal pursuit (Ferguson, 2008; Kopez et al., 2012). Finally, as noted in section 2.3.4, the NEP is not a pure measure of environmental attitudes, encompassing values, attitudes and beliefs. The NEP is conceptually similar to environmental values

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<sup>2</sup> We would like to thank one reviewer on their helpful comments regarding value versus goal activation, and for bringing this important issue to our attention.

including biocentrism (Stern & Dietz, 1994) and universalism (Schultz & Zelezny, 1999) with many studies observing a close relationship between NEP scores and environmental values (e.g., Schultz, 2001; Schultz et al., 2005; Schultz & Zelezny, 1999). Because of this close association between the NEP and environmental values, it is plausible that if value activation underpinned the behavioural effect, the NEP would have moderated the effect of goal priming on choice. We found no evidence for this. However, it would be useful in future research to identify whether a purer measure of environmental values moderates the effect of the environmental goal prime on behaviour. One final possibility is that the activation of environmental values would lead to more positive evaluations about the environment itself, yet there was no effect of priming on environmental attitudes. Given that goals and values are both motivational constructs, it is likely that a close relationship exists between environmental values and the pursuit of specific environmental goals. This is certainly an area worthy of future empirical investigation.

Our research provides evidence for the utility of stimulus-based goal activation (Pieters & Wedel, 2007), which may not require conscious goal setting. Without utilizing a nonconscious goal priming manipulation, we cannot fully rule out whether participants consciously adopted their own goal to protect the environment upon reading the materials. However, evidence from the funnelled debriefing procedure suggests that the operation of the goal was to some extent automatic, as participants did not report being consciously influenced by the goal priming materials. Additionally, the fact that implicit but not explicit attitudes differed as a function of priming lends further support to the notion that nonconscious processes were involved in the operation of the goal. Common methods used to experimentally activate goals include scrambled sentence tasks and subliminal priming paradigms. While conceptually useful, the utility of these techniques is confined to laboratory



settings. Our research utilized an alternate goal priming method, which could be adapted for use in a real world setting by policymakers and marketers wishing to encourage pro-environmental behaviour.

The current study supports existing research which has shown that mental accessibility of environmentally related constructs, including attitudes (Keenan, Amir & Gneezy, 2013) and values (e.g., Biel et al., 2005; Verplanken & Holland, 2002) is an important driver of environmental consumer choice. Combined with the current findings, these studies suggest that increased cognitive accessibility of environmentally related constructs, whether these are values, attitudes or goals, is an important driver of environmental choices. Notably, each study employed a different method of priming, ranging from pro-environmental messages in the current study to a poster in the lab (Biel et al., 2005), indicating that increased accessibility is not simply a method specific phenomenon. Additionally, these effects have been observed on multiple product choices, ranging from choices of unpackaged consumer goods, to choices of green gift cards (Keenan et al., 2013) and environmental friendly electronic items (Verplanken & Holland, 2002). Multiple methods that activate environmental constructs can therefore be utilized by policymakers to enhance green choices. For example, providing marketing materials around supermarkets which highlight the environmental implications of different product choices could activate a goal in a consumer to protect the environment, resulting in the selection of a greener product choice.

#### *4.2. Limitations and further research*

It would be useful in future research to establish the time frame of the priming manipulation. Activation of motivational constructs is associated with distinct temporal patterns compared to semantic activation. Further research would therefore benefit from

ascertaining whether the behavioural effects of the goal prime observed in this research persist or decay following a delay. Our results do however display another known signature of goal activation; increased value of goal-relevant means. Unlike semantic activation, goal activation involves increased value towards objects instrumental to goal attainment (Förster et al., 2007). We found that the environmental goal prime enhanced the value of the goal-relevant means (loose products) relative to unpackaged products as assessed via the IAT, supporting motivational activation. Additionally, as students are known to be more receptive to experimental manipulations, using samples with wider demographic characteristics would increase the generalisability of the findings. Finally, the applicability of priming manipulations outside of laboratory settings remains a controversial issue in psychological research. Future research would benefit from measuring observable rather than reported behaviour, and examining whether experimental goal activation persists in real rather than artificial choice environments<sup>3</sup>.

These suggestions notwithstanding, by showing that automatic evaluations mediate the relationship between goal priming and choice, our findings contribute conceptually to the evaluative readiness literature. Additionally, our findings demonstrate the value of re-activating environmental goals through information exposure during decision-making to produce more environmentally sustainable consumer choice. Whilst recent research has suggested that social marketing materials may have adverse behavioural effects (Harris, Pierce & Bargh, 2013), here we provide evidence that pro-environmental messages could have positive effects on consumption that may have long-term environmental benefits.

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<sup>3</sup> We would like to thank one helpful reviewer for highlighting this.

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Table 1.

Descriptive statistics as a function of goal priming condition

Goal priming condition	Implicit attitude	Explicit attitude	Percentage of loose
Environmental	.39 (.36)	6.38 (2.60)	65.25 (34.01)
Financial	.18 (.45)	6.60 (2.77)	49.88 (33.58)

*Note.* Standard deviations are in parentheses.

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Table 2.

Hierarchical multiple regression equation for mediation analysis

Regression equation	$R^2$	$b$	$SE$	$t$	$p$
Model 1: Goal priming → choice ( $c$ )	.05	7.69	3.78	2.04	.045
Model 2: Goal priming → choice ( $c'$ )	.18	4.51	3.66	1.23	.221
Implicit attitudes → choice		30.24	8.80	3.44	.001

Note.  $c$  = total effect,  $c'$  = direct effect.

Table 3.

Hierarchical multiple regression equations for moderation analysis

Variables entered	<i>b</i>	<i>SE</i>	<i>t</i>	<i>p</i>
Outcome variable: choice				
Goal priming (GP)	6.74	3.70	1.82	.07
NEP	1.27	.57	2.21	.03
GP x NEP interaction	-.38	.57	-.66	.51
$R^2 = .13, F(3,76) = 3.64^*$				
Outcome variable: implicit attitudes				
Goal priming (GP)	.10	.05	2.10	.04
NEP	.01	.01	1.69	.10
GP x NEP interaction	.00	.01	.20	.84
$R^2 = .10, F(3,76) = 2.75^*$				
Outcome variable: choice				
Goal priming (GP)	8.75	3.60	2.43	.02
EAI-24	14.74	5.14	2.87	.01
GP x EAI-24 interaction	-5.83	5.14	-1.13	.26
$R^2 = .17, F(3,76) = 5.19^*$				
Outcome variable: implicit attitudes				
Goal priming (GP)	.11	.05	2.55	.01
EAI-24	.14	.06	2.11	.04
GP x EAI-24 interaction	.04	.06	.67	.50
$R^2 = .12, F(3,76) = 3.35^*$				

\*  $p < .05$

## Appendix A

Environmental goal-prime (264 words)

*“Facts about Waste*

On average, each person in the UK throws away over eight times their body weight (about 500kg) in rubbish every year; Over 70% of household waste currently ends up in landfill, however the UK will run out of landfill space in less than seven years; Over 40% of the waste in our bins is retail packaging; Some materials, such as plastics and Styrofoam, are unable to be recycled and end up in landfill after only one use; Once in landfill, household waste materials can take up to 10,000 years to degrade; In the UK more than half a million birds and mammals die each year from ingesting waste that has polluted water streams from leaking landfills; Toxins produced by decomposing landfill waste can enter groundwater sources, contaminating drinking water supplies and threatening human and biodiversity health; Decomposing waste releases hazardous greenhouse gases such as methane and carbon dioxide into the atmosphere, causing air pollution and contributing to climate change; Whilst pollution caused by waste has harmful environmental and social consequences, it also largely preventable. The UK government has recently issued a public warning, urging consumers to be extra vigilant about reducing the amount of waste produced. The following guidelines have been provided:

1. Try to donate old items to charity rather than throwing them out.
2. Recycle where possible and avoid purchasing products made from non-recyclable materials.
3. Compost any leftover food items rather than throwing them in the dustbin.
4. Re-use plastic bags and reduce packaging consumption where possible.
5. Reduce unwanted post by removing your name from mailing lists.”

Financial goal-prime (284 words):

*“Facts about Identity Fraud*

Identity fraud, also known as identity theft, occurs when somebody uses a false identity or somebody else's identity details to obtain goods or services by deception; It is currently the UK's fastest growing crime; 10% of the UK population have been victims of ID fraud; 50% of ID fraud victims have lost money as a result, with the average amount lost being £1,190 per victim; The most common methods used to access personal identities include bin raiding, intercepting personal mail, card skimming, stealing purses/wallets, and through the internet; 88% of people who use social networking sites have shared items of personal information online that could be used by ID fraudsters; 97% of households regularly throw out documents which could be used to help steal their identity; It takes an average of 539 days to discover that you've become a victim of ID fraud and it can then take a further 300 hours of work to clear your name. Whilst identity fraud is a common and costly public issue, it is also largely preventable. The UK government has recently issued a public warning, urging consumers to be more aware about the risks of identity fraud. The following guidelines have been provided:

1. Shred all personal documents containing your identity before discarding them.
2. Change online and telephone passwords regularly.
3. When moving home alert your bank, card issuer and any other organisations you deal with, and re-direct mail from your old address for at least a year.
4. Alert the issuing authorities immediately if your bankcards, driving licence or passport has been stolen.
5. Stay safe online- ensure that your anti-virus software is up to date and always log out of internet sites containing personal details.”

*Acknowledgements*

We would like to thank Yu Li for his invaluable assistance with programming the experiments. We would also like to thank two anonymous reviewers for their helpful comments.

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Table 1.

Descriptive statistics as a function of goal-priming condition

Goal-priming condition	Implicit attitude	Explicit attitude	Percentage
Environmental	.39 (.36)	6.38 (2.60)	65.25 (%)
Financial	.18 (.45)	6.60 (2.77)	49.88 (%)

*Note.* Standard deviations are in parentheses



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(34.01)  
(35.58)

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Table 2.

Hierarchical multiple regression equation for mediation analysis

Regression equation	$R^2$	$b$	$SE$	$t$
Model 1: Goal-priming $\rightarrow$ choice ( $c$ )	.05	7.69	3.78	2.04
Model 2: Goal-priming $\rightarrow$ choice ( $\acute{c}$ )	.18	4.51	3.66	1.23
Implicit attitudes $\rightarrow$ choice		30.24	8.80	3.44

Note.  $c$  = total effect,  $\acute{c}$  = direct effect.

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<i>p</i>
.045
.221
.001

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Table 3.  
Hierarchical multiple regression equations for moderation analysis

Variables entered	<i>b</i>	<i>SE</i>	<i>t</i>	<i>p</i>
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Goal-priming (GP)	6.74	3.70	1.82	.07
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Outcome variable: choice				
Goal-priming (GP)	8.75	3.60	2.43	.02
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$R^2 = .12, F(3,76) = 3.35^*$				

\*  $p < .05$

5.79

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