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Doing more with less: Leveraging social norms and status concerns in encouraging conservation farm practices

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Doing more with less: Leveraging social norms and status concerns in encouraging conservation farm practices

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Abstract: Using an online survey with randomisation, we illustrate how identity-based utility can be harnessed to encourage pro-environmental behaviours. Results show that providing farmers with an opportunity to demonstrate their 'green credentials' increases their intention of maintaining environmental practices by an average of 19%, while the use of descriptive norms increases intent to participate in a biodiversity activity by an average of 8%. Interventions such as these represent a low-cost, yet powerful supplement to traditional policy tools. New approaches for engendering behavioural change are likely to be particularly important in a UK context as the UK transitions out of the EU.

Keywords: Social norms; peer-effects; environmental measures; farmers; agri-environmental schemes

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1 Introduction

Incentivising farmers to engage in pro-environmental behaviours, such as conservation, is an issue that is high on the political agenda (e.g. Marr et al., 2016). While historically farmland was valued primarily for its capacity to provide food and other raw materials, increasingly farmers are recognised as major influencers of environmental outcomes (Howley et al., 2014; Kantelhardt, 2006). Recognising this: the EU through the Common Agricultural Policy (CAP); the US through the US Farm Bills; as well as Australia and many other developed countries, have set up subsidy schemes to promote farmer conservation efforts. The principle behind these policy interventions is that many such activities that would be beneficial to society are not profitable at the level of an individual farmer. Therefore, agri-environment schemes (AES) have tried to encourage farmer participation in conservation efforts through financial inducements (e.g. Cary and Wilkinson, 1997), based upon the working assumption that farmers are rational profit-maximising agents (Edwards-Jones, 2006). However, examples abound in the literature of instances where farmers exhibit behaviour that would be against their financial self-interest (Howley et al., 2015; Key and Roberts, 2009; Musshoff et al., 2013). This means agri-environmental policy initiatives that are based on the assumption that farmers will seek to maximise profits have proven to be less effective than anticipated (e.g. Christensen et al., 2011; de Krom, 2017). This is not to say that business related objectives are not important to farmers. Rather, farmers operate within a social and cultural environment where, in many instances, profit may not be the sole driver of behaviour (Howley, 2015; Pannell et al., 2006; Vanclay, 2004; Willock et al., 1999a, 1999b).

In this study, we obtained 860 responses from farm operators and using a randomised online survey design, we tested whether interventions that harnessed identity concerns could be effective complements to monetary incentives when it comes to encouraging conservation farm practices. The first experiment tested whether there is a role for public policy to enhance the conspicuousness of pro-environmental behaviours as a means to encouraging conservation farm practices. With this

experiment, in cooperation with an agriculture and environment partnership ‘‘Championing the Farmed Environment’’ (CFE)ⁱ, we examined whether providing farmers with an opportunity to demonstrate their ‘‘green credentials’’ to the wider public would increase their stated intention to maintain environmental practices once their current AES contract ends. The second experiment examined whether providing farmers with information relating to the participation of other farmers in a hypothetical biodiversity activity increases their stated intention to engage in such an activity. We hypothesised that providing farmers with a descriptive norm relating to what relevant others do will act as a frame of reference and thus influence their own choices. Overall, our results suggest that nudges based on farmer status (publicity) and social norms can be effective in shifting intentions towards conservation behaviours.

The conceptual framework for the present study draws heavily from Lequin et al. (2019), who proposed that farmers’ propensity to adopt environmental policies can be characterised within a two-dimensional space which recognises the importance of both identity-based utility and profit related concerns. Although there are a variety of non-monetary influences on farmer’s behaviour, we focus on identity considerations as the basis of this work. Social identity theory offers a useful framework when considering identity issues (Hornsey, 2008; Tajfel, 1974). Social identity theory suggests that individuals have several social identities and their behaviour is influenced by a strong need to maintain conformity between their actions and the identities they seek to uphold (Benabou and Tirole, 2006; Tajfel, 1974). In essence, individuals form group attachments and in contrast to the rational agent model, their own behaviour is influenced by how they feel it will be judged by those within a shared social group. In this fashion, group norms come to act as behavioural reference points. Certain farm activities (e.g. environmental conservation) may be profit-enhancing but diminish identity-based utility as it may be perceived as not in keeping with the expected behaviour of individuals in a particular social group. Put differently conservation activity may be detrimental to farmers’ own self-image or the identity they seek to uphold. There may for instance be a conflict

between conservation farm practices and what is commonly referred to as a productivist identity (Burton, 2004a; Howley et al., 2015). Underpinning a productivist identity is a desire to maintain land in “good” condition and use all available land for agricultural production.

Looking beyond the agricultural sphere, social scientists and policy practitioners have taken advantage of the importance people place on identity considerations to influence behaviour across a variety of domains. One example is through the application of social norms in ‘nudging’ people towards societally beneficial behaviour. This involves communicating behaviour to people about what other group members do – a *descriptive norm* – or what other group members think people should do – an *injunctive norm* (Dessart et al., 2019; Farrow et al., 2017). Providing information in such a fashion has been shown to be effective in encouraging societally beneficial behaviour in a variety of domains such as reducing binge drinking (e.g. Werch et al., 2000) and littering (Brown et al., 2010; Cialdini et al., 1990) as well as increasing energy conservation (Schultz et al., 2007). Interventions based on social norms are thought to be effective because individuals will seek to marry their behaviour with the social identities they seek to uphold. Put simply, if individuals feel relevant others (i.e. people in a social group they identify with) are engaging in a specific behaviour, they are more likely to do so themselves because individuals do not operate within a social vacuum. Rather, they consider whether their actions are in keeping with the behavioural standards associated with relevant social groups.

A further related illustration of where identity concerns have been shown to affect behaviour is through a commonly reported desire to engage in activities that enhance one's social standing. People often perform good deeds (e.g. donate to charity) and tend to avoid selfish ones (e.g. stocking up on free sauces at a fast food restaurant) not purely because of altruism, but also because they care about their self-image (Sexton and Sexton, 2014). In other words, reputational concerns are important, and people may take actions primarily designed to boost their social standing. For example, public recognition has been shown to increase charitable donations (Karlan and McConnell, 2014), and

people's willingness to pay a premium for conspicuous environmentally friendly cars (Sexton and Sexton, 2014). Farmers have also been shown to engage in identity enhancing behaviours that confer social status even if they impose additional economic costs, e.g. over-investing in highly visible "Harvestore" silos in the rural United States (Lequin et al., 2019). Most agricultural experts recommend that U.S. farmers buy cheaper options for storing their corn and silage, but the status-conferring quality of the Harvestore appeals to many farmers (Lequin et al., 2019). A similar example in France concerns the "10-tons wheat club" (Salhi et al., 2012). Farmers often devote considerable resources to become a member, even if it is not economically profitable for them to do so.

Recognising the importance of identity-based utility in farmer decision-making, in this study we test a number of novel interventions designed to leverage identity concerns (i.e. social norms and social status) in encouraging environmentally beneficial behaviours. There exists a rich literature illustrating the importance of sociological and psychological constructs such as "identity" in understanding the behaviour of farmers (see Sulemana and James, 2014 for a summary). The majority of existing work has focused on using regression analysis to test whether various sociological and psychological constructs, such as identity, can predict farmer behaviour (e.g. Burton, 2004b; Howley, 2015; van Dijk et al., 2016). Other work has used techniques such as cluster analysis to develop typologies of farmers based on underlying values and/or identities (e.g. Maybery et al., 2005; Reimer et al., 2012; Sweikert and Gigliotti, 2019). However, relatively little research has looked specifically at the effectiveness of socio-psychological insights in forming interventions that are designed to change farmer behaviour. Recent exceptions include Kuhfuss et al. (2016a) who tested the effectiveness of social norms in encouraging the maintenance of AES benefits in the long run, and Pellegrin et al. (2018) who tested whether the "identifiable victim effect" as applied to plants could be used to encourage participation in a conservation program.ⁱⁱ

While research using regression and cluster analysis based approaches has done much to improve our general understanding of farmers' decision-making, we suggest that there is a need to move

beyond *understanding* towards *testing* how we can apply socio-psychological insights in leveraging real behavioural change. The present study aims to take a step in this direction by testing the effect of these mechanisms on stated preferences. Before describing the methods and results, we briefly summarise some of the existing work relating to farmer identities in the following section.

2 Farmer Identities

While long recognised as an important driver of individual behaviour in psychology and sociology, it is only relatively recently that identity considerations have been used by economists in analysing economic outcomes. Perhaps the most influential work in this area is that of Akerlof and Kranton (2000), who first introduced the concept of identity into the standard utility maximising framework. They proposed that people have several social identities, and that these identities can alter one's utility function or preferences. In this fashion, they suggest that identity can be used to explain behaviour in various scenarios where traditional utility maximisation fails to provide a satisfactory prediction. Considering farmers, two identities in particular have primarily been the focus for past research: *productivist* and *conservationist* (Burton, 2004a; McGuire et al., 2013), though a more recent study adds *civic-minded* and *naturalist* (McGuire et al., 2015). Someone identified as having a strong productivist identity is someone who places significant weight on status-markers such as high yields or more generally the appearance of the farm (Ribaudo, 2015).

A distinction is often drawn between productivist considerations and profit goals because maximising yields (or other status markers such as the general appearance of the farm) may not necessarily be synonymous with increasing profit (Burton and Wilson, 2006; Howley et al., 2015; Walford, 2003). An illustration of the importance of a productivist ethic can be obtained by looking at farmer behaviour after the 2003 CAP reform.ⁱⁱⁱ While this reform, and in particular the shift to decoupled payments, made it financially optimal for many farmers to reduce (even completely) their level of production, there was little evidence to suggest that farmers reacted in such a radical manner

(Gorton et al., 2008; Hennessy and Thorne, 2005; Howley et al., 2009). That is, farmers still overwhelmingly maintained a productivist mind-set and worked to keep their land in agricultural production. In effect, many farmers were subsidising unprofitable farm production with decoupled payments and off-farm income in order to maintain a *productivist*-oriented lifestyle.

While a productivist ethic is no doubt prevalent amongst farmers and feeds into farmers overall perception of what it is to be a 'good farmer', it is also true that a *conservationist* identity is important to many. For example, while certain cohorts of farmers appear unwilling to participate in an agri-environment scheme even when they can set the price themselves (Vanslebrouck et al., 2002), many others appear willing to engage in unsubsidised pro-environmental behaviours (Lokhorst et al., 2011). Central to the conservationist identity is the fact that many farmers regard themselves as not just business owners but also as custodians of the countryside and are concerned with leaving a legacy for future generations (Lequin et al., 2019). They may also enjoy the prestige and social status associated with being known as someone who cares about the environment (Atari et al., 2009; Michel-Guillou and Moser, 2006).

We suggest that both productivist and conservationist identities will, to varying degrees, be important to farmers. The question arises as to *which* identity will be prevalent in a particular context. Research in this area suggests that a given identity will shape behaviour when it is made more salient (Benjamin et al., 2010; Hogg and Turner, 1987; Oakes et al., 1991), and situational cues can activate an identity (Lequin et al., 2019). This serves as the theoretical underpinning of our experiments. We propose that by framing environmentally beneficial practices in a certain way as to activate (or make more salient) a conservationist identity, we can encourage pro-environmental behaviours.

In our first experiment, we test the effectiveness of two interventions designed to allow farmers the opportunity to demonstrate their 'green credentials' to the wider public. Experimental evidence suggests that people prefer to engage publicly rather than privately when it comes to prosocial behaviour in order to gain in social status (Anderson and Kilduff, 2009; Sexton and Sexton, 2014; Van

Vugt and Hardy, 2010). In other words, identity concerns can serve to encourage people to undertake costly actions in order to demonstrate pro-social behaviour to others. This has been referred to as conspicuous conservation (Sexton and Sexton, 2014). In this experiment, which we label as our *status-intervention*, we test the effectiveness of various mechanisms designed to allow farmers the opportunity to demonstrate their green credentials. Typically, farmer engagement in conservation practices is largely unobservable to the public. Other status markers associated with a productivist as opposed to conservationist identity such as high yields and the general appearance of the farm are more readily demonstrable to other farmers. In keeping with the idea of conspicuous conservation, we hypothesise that providing farmers with the opportunity to boost their self-image by demonstrating their 'green' credentials to the public will help activate a conservationist identity and thus encourage environmental conservation.

In our second experiment, we test the effectiveness of two group norm appeals, which describe the environmental practices of other farmers. For ease of description, we label this as our *social-norm intervention*. Our expectation is that communicating what relevant 'others' do when it comes to environmental stewardship will encourage farmers to see pro-environmental behaviours as identity-enhancing, thereby activating a conservationist mindset.

3 Methods and data

We conducted a survey of farmers in receipt of CAP subsidy payments in the UK during March to July 2019, using 1999-2013 address data from farmsubsidy.org. The survey and correspondence was designed using the principles of tailored-design (Dillman et al., 2014). An invitation letter sent by mail explained that the aim of the survey was to better understand the preferences of farmers to inform the future of farming, and also included a handwritten "with compliments" slip with a smiley face to encourage respondents. The letter contained instructions for accessing the online survey via a shortened web link for easier input. A reminder letter was sent approximately 3-4 weeks after the

initial invitation. In a pilot, we invited a random sample of 450 farms and received 36 responses (8%). Since response rates have been typically close to or below 10% in similar farmer surveys (e.g. see Kuhfuss et al., 2016a; Pellegrin et al., 2018), and since our data source meant that some addresses may be incorrect or out of-date, we randomly selected 12,000 addresses from the sample frame to ensure that we obtained a sufficient sample size. A conservative 5% response rate would then have provided 600 responses. At the time of writing 623 of the 12,000 letters that were mailed were returned as undeliverable, or we received correspondence stating that they could not or did not wish to complete the survey. From the remainder, we received 860 responses in total (7.5%). Of these, 235 responded that they were currently enrolled in an AES, of which 232 completed the status-intervention question (75 in the control, 72 in treatment 1, 85 in treatment 2). There were 799 responses to the social-norm intervention question (264 in the control, 273 in treatment 1, 262 in treatment 2). For a full breakdown of the characteristics of farmers and holdings in the sample, the reader is referred to Tables A1 and A2 in the appendix.

The overall aim of this survey was to test the potential effectiveness of randomised non-price interventions that encourage conservation farm practices. Both of our main questions consisted of a control condition and two treatment conditions. For each question, farmers were shown one of three possible versions of the question in a between-subjects manner. We looked at the mean response patterns of farmers to the control question and compared this to each of our treatment conditions. One possible threat to the validity of our comparison between treatment and control groups is if despite random assignment, the characteristics of farmers in the control and our treatment conditions differ. We do not expect any such differences to be correlated with our treatments, i.e. the extent to which individuals may be affected by our interventions. However, to alleviate these concerns we compared the distribution of farmers according to key farm personal and structural characteristics across our control and treatment groups. This information is provided in Table A3 in the appendix. As we can see in this table there are no unusual differences in demographic characteristics (age,

education, gender, marital status) or farm characteristics (farm size, annual income, farm type) across the treatment and control groups. We note, however, that because these questions were at the end of the survey, coupled with the often-reported reluctance of people to report certain socio-demographic data such as income, we did not have complete demographic and farm characteristics data for approximately a third of our respondents. Notwithstanding this point, the information presented in Table A3 do strongly support the suggestion that our control and treatment groups are broadly equivalent in terms of key demographics and farm structural characteristics. In what follows, we describe each of our experiments in more detail.

3.1 Status

AES were originally introduced in the EU in the 1980s and have been mandatory for member states since 1992 (Hodge and Reader, 2010), but voluntary for farmers. The aim of these schemes has been to reduce pressures on the environment by incentivising farmers to mitigate the environmental impact of agriculture by engaging in voluntary environmentally beneficial farm practices. Some examples include crop rotation, reduced inputs of fertilisers, enhancing habitats for wildlife and buffer strips. Farmers commit to these practices for a set contract length (typically around five years) but are free to return their land to previous land uses once the scheme ends. The question we ask is whether we can leverage socio-psychological insights, in particular the desire to seek social status, to encourage farmers to maintain their environmental features once their current AES ends. This is a particularly relevant question in the UK at this point in time, as it seems likely that the UK is heading for an exit from the EU (often informally referred to as ‘‘Brexit’’), and hence the CAP. If this happens, there is likely to be less financial support available for agri-environmental schemes (Franks, 2016).

We designed a hypothetical experimental question in conjunction with the CFE with a control and two different treatment conditions. This question tested whether giving farmers an opportunity to demonstrate their ‘green credentials’ to the wider public can encourage them to maintain AES practices after their contract ends. First, we asked farmers to state whether they were currently

enrolled in an AES. The farmers that said they were currently in an AES were randomly shown a follow-up question that was drawn from three possible alternatives: a control and two different treatment conditions. Farmers in the control group were asked the following question: *“Do you plan to maintain the changes you have made to your farming practice as a result of the scheme after your agri-environment scheme agreement ends, even if the contract is not renewed?”*

Both of our treatment conditions supplemented this information with a statement indicating how the CFE wants to demonstrate the important work that farmers do in supporting the natural environment. The *award* treatment condition added the following text before asking the same question as in the control condition: *“The CFE (Championing the Farmed Environment) wants to demonstrate the important work that farmers do in supporting the natural environment. Farmers who have maintained measures after their agri-environment scheme contracts have ended will be considered for nomination within an ‘Environmental Farming Champion’ award scheme. This would help to ensure that the general public are aware of the important work that these farmers do in protecting the environment.”* The *website* treatment condition added the following text before asking the same question as in the control condition: *“The CFE (Championing the Farmed Environment) wants to demonstrate the important work that farmers do in supporting the natural environment. Farmers that have maintained measures after their agri-environment scheme contracts have ended will receive recognition of their work on the CFE’s ‘Environmental Champion’ webpages. This would help to ensure that the general public are aware of the important work that these farmers do in protecting the environment.”*

Our expectation is that being able to demonstrate one’s contribution to the environment publicly will increase stated intentions to maintain existing environmental features. We had, however, no strong *a priori* expectation regarding which treatment would be more effective (nomination for an award or recognition on a website). Both of these conditions were designed in conjunction with the CFE to be relatively realistic and actionable initiatives that they are interested in adopting in future practice. As such, we were interested in understanding firstly whether either treatment condition was

effective in changing intended behaviour; and secondly whether one treatment worked more effectively in changing intended behaviour than the other.

3.2 Social norms

Working again in partnership with the CFE, we developed a plausible but hypothetical scenario where farmers were asked to indicate their willingness to participate in a wildlife event. The event would involve spending half a day taking photographs of as many different kinds of butterfly as possible. This activity resembles previous wildlife awareness events that the CFE and partner organisations have been involved in running, and one which could feasibly be organised in future. Therefore, it would be in their interest to understand how to maximise interest and participation. The control condition provided farmers with some background information and simply asked them to indicate on a 0 to 10 scale how interested they would be in taking part in such an activity, if at all. The specific background information used in the survey was: *“Farms are home to a large quantity and variety of wildlife. A new potential initiative involves providing information to farmers about different species of pollinators found in the countryside. Farmers would be asked to spend half a day to photograph as many different kinds of butterfly as possible, and upload them to a website. This information would be collated in order to produce materials that will help us to learn more about Britain’s natural habitat.”*

The two treatment conditions were designed to test the effectiveness of two different descriptive norms in increasing stated intentions to participate in this wildlife activity. Descriptive norms provide individuals with information relating to the typical behaviour of other group members (in this case, other farmers). In the first treatment condition we added the following text to the background information described above: *“Many farmers have demonstrated how much they value the natural environment by taking part in similar activities in the past. For example, 121 species were recorded by farmers on over 950,000 acres of farmland, in a recent event organised by the Game and Wildlife Conservation Trust.”* These statistics were obtained from information provided on the National Farmers’ Union website and provide information relating to aggregate number of other farmers who have engaged in a

similar activity in the past.^{iv} Our *a priori* expectation was that providing a frame of reference relating to how many other farmers engage in similar activities will encourage other farmers to participate in this activity.

We then developed a second treatment which used a different type of descriptive norm. In this second treatment condition, we added the following information taken from a survey of farmers by the Countryside Research Institute (Mills et al., 2013) to the material presented to those in the control group: *“Many farmers have demonstrated how much they value the natural environment by taking part in similar activities in the past. For example, a recent survey by the Countryside and Community Research Institute has highlighted how two-thirds of farmers undertake environmental activities on an informal basis.”* The main rationale for the inclusion of this descriptive norm was mainly as a robustness check where we could again test the effectiveness of using social norms, but this time using a different statistic. Similar to our first treatment, the descriptive norm used here again provides a frame of reference to farmers but is perhaps less tied to the specific activity under examination. Our hypothesis is that because people tend to conform with group norms (see Kuhfuss et al., 2016b for an overview), farmers in both of these treatment groups will express a greater willingness to participate in this wildlife activity.

4 Results

Before moving on to our key results, we first present some descriptive data relating to farmers responses to two questions designed to assess their environmental attitudes. The first question asked: “As a farmer, would you describe yourself as 'environmentally-friendly'?”, and the second asked: “Do you believe other farmers have a duty or responsibility to protect the environment?” The responses to these two questions are summarised in Figure 1. Most farmers in our sample (95%) described themselves as environmentally friendly, and the belief/norm surrounding the environmental responsibility of farmers is stronger still (Figure 1b). We note that notwithstanding the

anonymous nature of the survey, these overall trends are likely to be subject to social desirability bias. However, they do give a general indication of farmers' views and more importantly for our purposes, as we discuss later, collecting this information subsequently allowed us to undertake exploratory analyses in order to understand whether environmental attitudes moderated the extent to which individuals were subject to influence by our social norm and status interventions.

Insert Figure 1 here

4.1 Status intervention: maintenance of environmental measures

In our sample, 235 of the 607 farmers who completed the question (38.7%) reported that they were currently enrolled in an agri-environment scheme. Each of these farmers were asked whether they planned to maintain the changes they had made to their farming practice as a result of participating in the scheme, even if the contract was not renewed. Responses could take one of four possible values on the following four-point scale: definitely not, probably not, probably yes, definitely yes. Because this scale forces a choice, in coding these responses, we used the values -2, -1, 1, 2; i.e. leaving a space where a neutral response would have been in order to create a cardinal scale that implies there is a larger difference between a "yes" and a "no" than there is between different magnitudes of yes or no. 75 respondents were randomly assigned to the control condition (no additional recognition offered), 72 were assigned to the award condition (farmers could potentially be nominated for a CFE environmental champion award), and 85 were assigned to the website condition (farmers could potentially be recognised on the CFE's environmental champion webpages). Figure 2a plots the raw responses. We see that both treatment conditions result in an increase in the number of farmers planning to maintain environmental measures, though the website condition makes the most difference at the extreme "definitely yes" end of the scale. If we pool the responses that answered either probably yes or definitely yes, then 68% of respondents plan to maintain measures in the control condition, 82% plan to maintain measures in the award condition, and 80% plan to maintain measures in the website condition.

Using the aforementioned coding scheme, one-sided t -tests of whether the mean in the treatment condition is greater than in the control condition yield p -values of 0.0344 (award treatment) and 0.0064 (website treatment). Given that the cardinal scale used may be problematic, we also performed a Mann-Whitney U test of ordinal rank. This yields p -values of 0.1091 (award treatment) and 0.0127 (website treatment). In order to avoid the issues associated with cardinality, we also generated a simple binary variable, where we assigned a value of 0 to both “definitely not” and “probably not”, and a value of 1 to both “definitely yes” and “probably yes”. This allows us to perform t -tests simply on whether each treatment significantly increases the number of people that plan to maintain environmental measures, regardless of preference strength. The means and 95% confidence intervals of this binary variable are plotted in Figure 2b. One-sided t -tests of mean differences yield p -values of 0.026 (award treatment) and 0.0418 (website treatment). We report one-sided p -values for additional power given we know the direction of the expected effect (two-sided p -values can be obtained by doubling the one-sided p -values).

To conclude, from an environmental stewardship perspective, what is encouraging is that the majority of farmers plan to maintain their ‘pro-environmental’ farm practices, even when their current AES ends and they are under no financial obligation to do so. This is in keeping with previous research on French farmers (Kuhfuss et al., 2016b). What these results make clear, however, is that providing farmers with an opportunity to demonstrate this publicly can substantially further increase intentions to maintain environmental features.

Insert Figure 2 here

4.2 Social-norm intervention: wildlife activity

As outlined in Section 3.1, our question testing social norms asked how interested farmers would be in taking part in a hypothetical wildlife photography activity. Each question was scored from 0 to 10, where 0 means “not at all interested” and 10 means “extremely interested”. In the control treatment, which described the activity but contained no social norm, the mean level of interest was

4.38 ($n = 264$, $\sigma = 3.24$). To examine the potential effectiveness of social norms in encouraging participation we first pooled our treatment conditions (both descriptive norm appeals) and compared mean response to farmers in our control group. The mean level of interest in our treatment groups was 4.73 which represents an 8% increase, relative to the control group. A one-sided t -test testing the alternative hypothesis that the mean in the treatment condition is greater than the mean in the control condition results in $p = 0.07$.

Next, we looked at each treatment separately (Figure 3). In the first social norm treatment, which included facts about the number of species and land area covered in a similar real previous event, the mean level of interest was 4.82 ($n = 273$, $\sigma = 3.20$). This represents a 10% increase in interest over the control condition and a one-sided t -test yields $p = 0.056$. In the second social norm treatment, which provided a statistic from a previous survey about the proportion of farmers that undertake environmental activities on an informal basis, the mean level of interest was 4.62 ($n = 262$, $\sigma = 3.01$), a 5.5% increase over the control condition. While of the hypothesised direction, this difference was not statistically significant ($p = 0.19$). Considering these results as a whole, the findings support the suggestion that descriptive norms particularly when specifically tied to the behaviour in question can encourage pro-environmental behaviours, albeit the effect sizes in this instance are modest.

Insert Figure 3 here

4.3 The moderating effect of environmental attitudes on treatment effectiveness

In addition to our primary analyses, we were also interested in whether attitudes towards the environment shown in Figure 1 could affect the extent to which the social norm and status interventions were effective. Put differently we were interested in exploring whether environmental attitudes moderate the effect of our treatments. The intuition is as follows: if these interventions

operate through activating a conservationist identity, then this 'activation' may primarily occur for those who have a pro-environmental self-image or identity to begin with.

In Figure 1, we can see that 53% of respondents answered "definitely yes" to the question of whether they would describe themselves as environmentally friendly, while 69% answered "definitely yes" to the belief that farmers had a duty or responsibility to protect the environment. In order to examine if environmental attitudes moderate the effectiveness of our interventions, we first derived two dummy variables that were equal to 1 when responses to these respective environmental attitude questions were "definitely yes", and 0 otherwise. For ease of use, we label individuals who respond definitely yes to each of these questions as *environmentally-friendly* and *environmentally-responsible* respectively. For saliency, we then pooled the two treatment conditions in each of the wildlife activity (social norm) and maintaining environmental measures (status intervention) scenarios. We then analysed the effect of these treatments for farmers belonging to each of the *environmentally-friendly* and *environmentally-responsible* sub-groups separately and compared this to farmers in the control group for each experiment.

Figure 4a and Figure 4b show that the social norm treatments significantly increase the level of participation interest, but only for farmers who strongly identify as *environmentally-friendly* ($p = 0.0001$) or *environmentally-responsible* ($p = 0.0001$). Relative to the control group, we can see that the treatment (social norm messages) did not increase willingness to engage in this environmental activity for farmers who do not belong in the *environmentally-friendly* or *environmentally-responsible* sub-groups. It would seem, therefore, that descriptive norms can be an effective strategy for encouraging conservation farm practices, but principally for those with relatively strong pro-environmental attitudes to begin with.

Figure 4c and Figure 4d repeat this analysis when it comes to the maintenance of environmental measures (status intervention). We note, however, that once we divide the sample into two groups we are left with small cell sizes, and so these results need to be interpreted cautiously. Looking at Figure

4c, we can see that there are no significant differences in the effectiveness of the treatment between the two *environmentally-friendly* sub-groups, i.e. both are significantly different than the control and not significantly different from each other. We do find, however, that our treatment (status-intervention) is primarily effective for those individuals classified as *environmentally-responsible* (Figure 4d) which again suggests that environmental attitudes may moderate the effectiveness of these treatments.

One implication of these results is that if a government body or farmer organisation enacts an intervention designed to invoke social norms or increase social status in order to encourage pro-environmental behaviours, then this may primarily be effective for those who have strong pro-environmental attitudes to begin with. This is not to diminish the potential of these interventions for engendering behavioural change, rather highlights the need for a diversity of approaches when seeking to change behaviour across the farming body as a whole. These initial results also point to some useful directions for future work. While there is much research across the social sciences looking at the effectiveness of what we classify for simplicity as socio-psychological interventions, there is comparatively little research exploring heterogeneity in impacts. That is, there is much to learn regarding which particular sub-groups are subject to influence in a given circumstance.

Insert Figure 4 here

5 Discussion and conclusions

Drawing on insights from social-psychology and behavioural economics, our conceptual framework characterised whether farmers would favour pro-environmental behaviours according to the expected consequences for their social identity. Proponents of economic instruments usually contend that “appropriate” price signals are all that is required to achieve changes in farmers’ behaviour (Maybery et al., 2005). While price signals such as financial inducements or added profitability (e.g. through yield enhancements) can improve the attractiveness of certain conservation

farm practices, it could be that there is limited potential to this approach. For instance, a lack of farmer participation even when profitable has limited the scope and efficacy of environmental programs (Carey et al., 2005; Pellegrin et al., 2018).

To date, the conventional policy prescription amongst economists and other advisors in encouraging conservation activity is to increase its profitability. This is based on the idea that farmers are rational agents who will engage in activities that will maximize their profits, regardless of other nonmonetary considerations (Howley, 2015; Pellegrin et al., 2018). Farmers may however experience more than changes to their finances when changing their farm activity. For instance, while costs and returns are clearly important for farmers' decision-making, identity considerations may make it optimal from an overall utility perspective to not engage in what may look like a more efficient farm practice. To put it simply, a particular practice may be profit-enhancing but diminishes farmers' identity, e.g. their conceptualisation of what it is to be a good farmer. Our argument is not that subsidies or other policy instruments are ineffective, but rather that there is limited potential to these approaches. This is because, for many, farming is not just a business but a way of life (Gasson, 1973; Howley, 2015; Willock et al., 1999a, 1999b). More generally, farmers operate within a social and cultural environment and identity-based utility can be an important component of farmers' decision-making.

Whilst identity-based considerations may discourage certain conservation practices given a potential conflict with a productivist ethic, it is also true that they can be harnessed to encourage pro-environmental behaviours. This study highlights two interventions with significant potential for harnessing real behavioural change when it comes to environmentally beneficial farm practices. The first draws upon the idea that reputational concerns are important to people. That is, people often seek to increase their social standing through their behaviours. In this way, behaviour is not just a reflection of individualistic needs but is also shaped by social identity. Our results suggest that simply providing farmers with a mechanism to demonstrate their green-credentials could encourage

conservation farm practices, especially because some of these practices may otherwise be invisible or misunderstood by the general public (Dessart et al., 2019). Such an approach can be seen as leveraging a “keeping up with the Joneses” type concept but one designed to enhance societally beneficial environmental outcomes. The second relates to social norms and draws on the idea that individuals will tend to conform with behaviour that is in keeping with the perceived norms of groups to which they share a similar social identity (e.g. other farmers). Many farmers engage in a plethora of informal environmental practices for a host of non-monetary reasons (e.g. altruism, legacy, prestige) and simply providing this information to farmers in an accessible manner can encourage further conservation practices in that it can help to activate a conservationist identity.

A potential limitation with this work is that we rely on stated intentions as opposed to actual behaviour when estimating the impact of our proposed interventions. It is possible that farmers will either behave strategically or be influenced by social desirability bias leading them to misstate their willingness to engage in conservation practices. Crucially, because farmers were randomly assigned to treatments, there is no reason to expect that these effects will differ between our treatment and control groups. This means that our proposed interventions should capture the actual impact of leveraging social norms and status concerns in encouraging conservation practices. However, we cannot be as certain of the actual proportion of farmers who would engage in each particular activity.

Taken together, our results suggest that there is a significant role for public policy in leveraging socio-psychological insights to encourage conservation farm practices. A characteristic feature of much of what we propose and indeed interventions which draw on behavioural science more generally is the need for little if any additional funding. Low-cost interventions of this sort seem particularly important in the UK context. While the UK government has committed to upholding the current design under the Common Agricultural Policy until 2022, the UK will need to develop a new set of agricultural support policies following the transition out of the EU (commonly referred to as Brexit).

The question arises as to what these new policies will look like. While there is a considerable degree of uncertainty, government spokespeople have indicated a preference for a more market-oriented policy and importantly one with a lower overall level of financial support (Franks, 2016; Marr and Howley, 2019). This will of course be of serious concern to the agricultural sector, but the upside, if it can be characterised as such, is that there will be added scope to re-design both how we structure and design any support payments, as well as more broadly engage with farmers in order to enhance the overall scope and effectiveness of any policy interventions. Already there is much debate amongst relevant stakeholders regarding what agricultural policy should look like in a post Brexit (CAP) landscape (e.g. Grant, 2016; Hill, 2017; Swinbank, 2017). We agree with recent sentiments suggesting that insights from social psychology and behavioural economics, especially when tested using experimental methods, have an important role to play in the debate on future agricultural policy (Thoyer and Préget, 2019). Although nudge-based interventions cannot replace market-based policy approaches entirely (Loewenstein and Chater, 2017), when they are used in tandem with traditional policy, they have the power to shift agricultural behaviour towards societally beneficial outcomes with relatively little additional funding. We believe this study represents one step towards the development of a more holistic agricultural policy approach.

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Appendix

Table A1: Farm characteristics

	N	%
<i>Farm classification</i>		
Cereal	93	15.58
Dairy	44	7.37
General Cropping	62	10.39
Horticulture	6	1.01
Livestock (LFA)	117	19.60
Livestock (lowland)	98	16.42
Mixed	145	24.29
Specialist poultry	1	0.17
Other (not listed above)	31	5.19
<i>UK region</i>		
East Midlands	47	7.87
East of England	72	12.06
London	2	0.34
North East	27	4.52
North West	40	6.70
Northern Ireland	3	0.50
Scotland	83	13.90
South East England	61	10.22
South West England	116	19.43
Wales	37	6.20
West Midlands	53	8.88
Yorkshire and the Humber	56	9.38
<i>Total holding size</i>		
0 to 9 hectares	21	3.55
10 to 19 hectares	34	5.75
20 to 49 hectares	88	14.89
50 to 99 hectares	122	20.64
100 hectares or more	326	55.16
<i>Annual farm income (inc subsidies)</i>		
£0 to £15,000	102	19.54
£15,001 to £30,000	94	18.01
£30,001 to £45,000	62	11.88
£45,001 to £60,000	41	7.85
£60,001 to £75,000	23	4.41
£75,001 to £90,000	24	4.60
£90,001 to £105,000	23	4.41
£105,001 to £120,000	29	5.56
£120,001 to £135,000	6	1.15
£135,001 to £150,000	12	2.30

£150,001 to £165,000	12	2.30
£165,001 to £180,000	4	0.77
£180,001 to £195,000	4	0.77
£195,001 or above	86	16.48

Table A2: Demographic characteristics

	N	%
<i>Gender</i>		
Male	499	83.87
Female	89	14.96
Prefer not to say	5	0.84
Other	2	0.34
<i>Age group</i>		
Under 20 years old	1	0.17
20-29 years old	24	4.05
30-39 years old	48	8.11
40-49 years old	84	14.19
50-59 years old	187	31.59
60-69 years old	160	27.03
70-79 years old	73	12.33
80-89 years old	15	2.53
<i>Marital status</i>		
Single	54	9.08
Married or living with a partner	485	81.51
Divorced/separated	26	4.37
Widowed	16	2.69
Prefer not to say	14	2.35
<i>Has any children?</i>		
No	120	20.17
Yes	460	77.31
Prefer not to say	15	2.52
<i>Highest level of education</i>		
Below high school	49	8.39
High school	224	38.36
Undergraduate degree	253	43.32
Postgraduate degree (e.g. Master's)	50	8.56
Doctorate/PhD	8	1.37

Table A3: Respondent characteristics across treatment conditions

	Wildlife activity			Maintain measures		
	Control n = 264	Treat 1 n = 273	Treat 2 n = 262	Control n = 75	Award n = 72	Website n = 85
Age						
0-39	23	23	27	7	9	9
40-49	21	33	30	13	10	15
50-59	66	63	58	26	21	23
60-69	54	56	50	20	23	21
70 or above	37	28	23	8	8	16
Education						
Below high school	16	18	15	5	2	7
High school	79	74	71	12	24	20
Undergraduate	86	94	73	42	36	48
Postgraduate / Doctorate	17	17	24	13	8	7
Farm size						
0-19 ha	25	17	13	4	2	2
20-49 ha	24	30	34	6	5	8
50-99 ha	43	44	35	13	16	12
100 ha or above	110	111	105	51	49	62
Farm income						
£0 - £60,000	95	113	91	34	31	37
£60,001 - £120,000	34	33	32	7	14	14
£120,001 - £180,000	8	14	12	6	3	8
£180,001 or above	37	23	30	13	13	14
Gender						
Male	172	167	160	62	62	70
Female	26	37	26	11	9	12
Other / prefer not to say	4	0	3	1	0	2
Farm type						
Cereal	33	35	25	13	13	14
Dairy	14	14	16	2	6	4
General cropping	23	20	19	6	9	11
Horticulture	1	2	3	0	9	1
Livestock (LFA)	36	37	44	16	13	20
Livestock (Lowland)	32	37	29	12	8	11
Mixed	51	50	44	24	22	20
Specialist poultry	0	1	0	0	0	0
Other	13	9	9	2	1	3
Marital status						
Single	20	11	23	6	3	6
Married / living with partner	160	174	151	62	60	66
Divorced / separated / widowed	17	14	11	4	8	7
Prefer not to say	5	5	4	2	0	5
Environmentally-friendly						

Definitely not	1	11	2	0	0	0
Probably not	6	11	8	1	2	2
Probably yes	84	82	86	29	21	29
Definitely yes	112	111	94	45	49	53
Environmental resp. of others						
Definitely not	2	2	4	0	2	1
Probably not	2	1	4	1	0	0
Probably yes	53	60	56	19	15	16
Definitely yes	146	141	126	55	55	67

Note: Not all individuals that responded to the experimental questions also completed all of the demographic information at the end of the survey. For those that did provide this information, the table suggests that randomisation was effective.

Figures

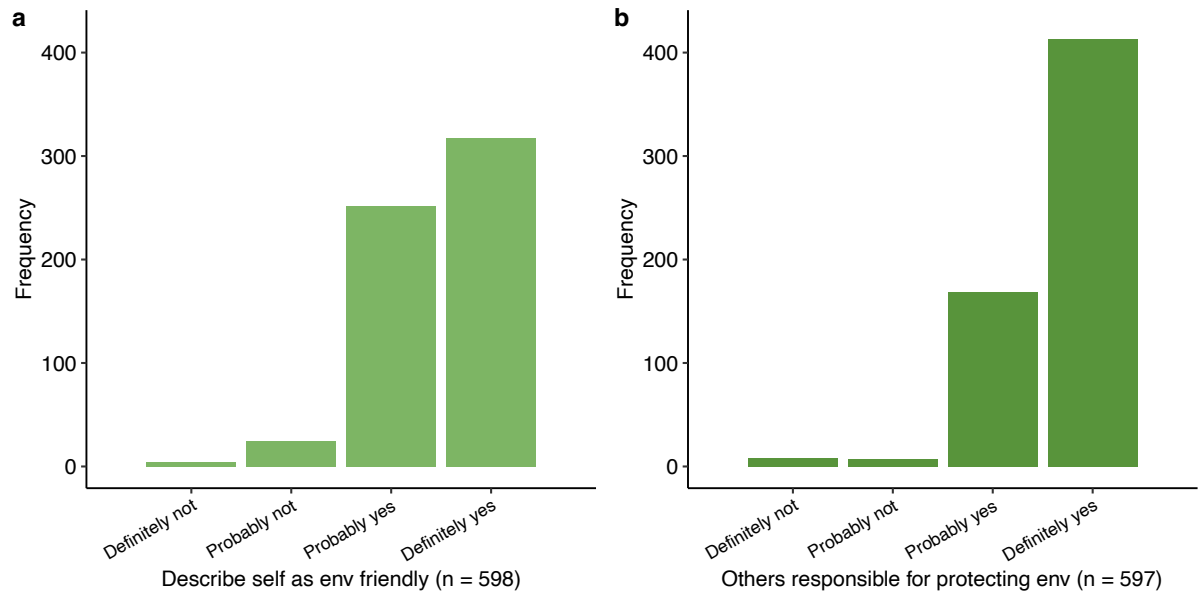


Figure 1: Respondent attitude towards environment (a), as well as their beliefs about the desired behaviour of other farmers (b).

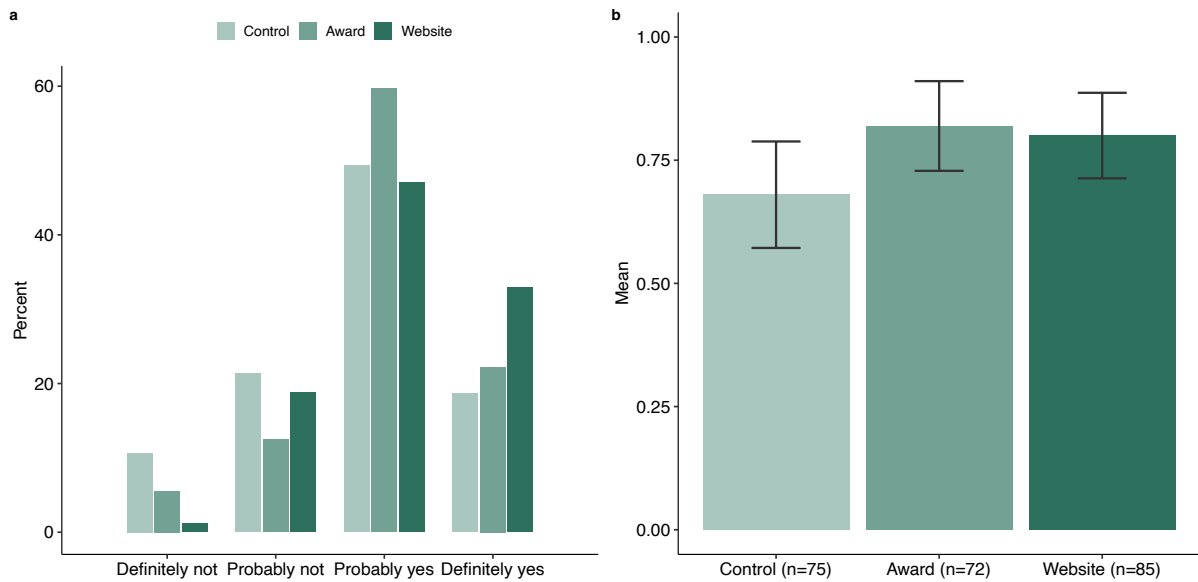


Figure 2: (a) Whether individuals would maintain environmental measures even after AES contract ends, separated by treatment. (b) Means of responses in each treatment when coded as binary yes = 1, no = 0 data, with 95% confidence intervals.

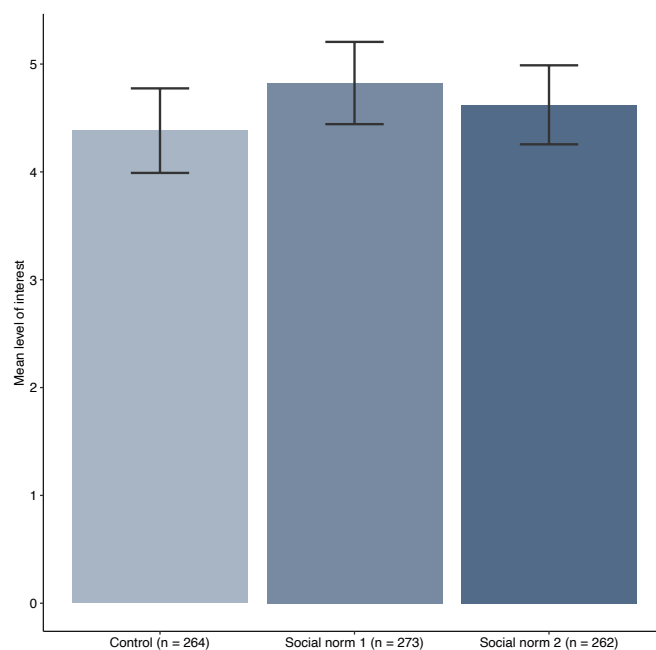


Figure 3: Mean level of interest in wildlife activity by treatment. 95% confidence intervals are plotted using the *t*-distribution.

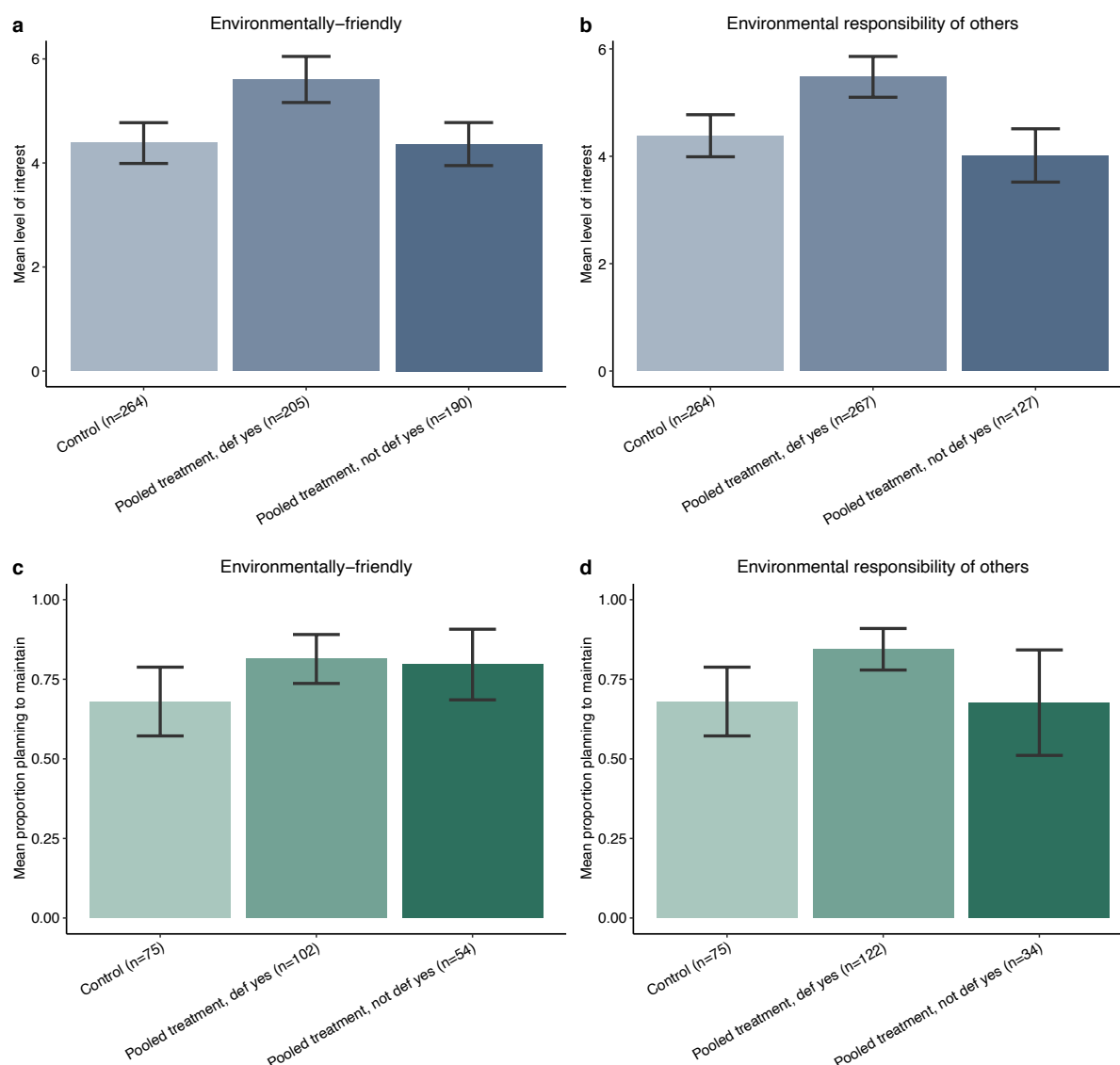


Figure 4: The impact of environmental attitudes on treatment effectiveness. (a) and (b) refer to the social-norm question on interest in a biodiversity activity; (c) and (d) refer to the status question on maintaining environmental measures.

ⁱ The CFE (<http://www.cfeonline.org.uk/about-us/what-we-do/>) is a partnership aimed at both providing advice to farmers and promoting the work that farmers already do in improving the natural environment on their farm.

ⁱⁱ The identifiable victim effect is the name ascribed to the phenomenon whereby an individual has a greater willingness to offer support to an identifiable individual rather than statistical or anonymous victims (Jenni and Loewenstein, 1997).

ⁱⁱⁱ The 2003 CAP reform primarily involved the decoupling of some agricultural payments from production. This left farmers more free in theory to make production decisions based on a free-market. It was designed to eliminate distortionary policies that had the potential to result in the

production of foods that were not otherwise in demand. In addition to this, some aspects of rural development policy were enhanced at the cost of a reduction in direct farm payments.

^{iv} A full description of the event can be found here:

<https://www.nfuonline.com/news/bulletin/farmers-record-121-species-across-950000-acres-during-big-farmland-bird-count/>