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**PEER INFLUENCES AND PRO-  
ENVIRONMENTAL BEHAVIOR: PANEL  
EVIDENCE FOR THE ROLE OF  
REGIONAL PREVALENCE AND  
DIVERSITY**

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Ann-Kathrin Blankenberg  
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GEORG-AUGUST-UNIVERSITÄT GÖTTINGEN

# Peer influences and pro-environmental behavior: Panel evidence for the role of regional prevalence and diversity

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## Abstract

Pro-environmental behavior depends on the behavior of others. For a UK panel data set, we find that individuals' pro-environmental behavior increases in the behavior of peers in their region. This happens the more so, the greener the self-image of an individual. Diversity of regional green behavior plays a further role, with fractionalization negatively related to pro-environmental behavior and polarization positively so: peer pressure exerts a less strong influence when behaviors are diverse, and a stronger influence when behaviors are very polarized.

Keywords: pro-environmental behavior, peer influence, prevalence, fractionalization, polarization, UKHLS

JEL codes: Q53, Q56

## 1. Introduction and pertinent literature

People aren't monads: our behavior is not only driven by our own preferences and identity (Akerlof and Kranton, 2010, Owen et al., 2010; Whitmarsh & O'Neill, 2010), but also through observed behavior of others or through the existence of norms (Farrow et al. 2017). Imitating successful behavior is an effective way of learning ("observational learning", Bandura, 1986), and

obeying prevailing norms plays an important role in stabilizing and transmitting behaviors (Farrow et al. 2017; Boyd and Richerson, 1985, Acemoglu and Jackson, 2017). With regard to pro-environmental behaviors (PEBs), this role of peer influences is being increasingly recognized (for overviews see Farrow et al. 2017): studies on “green competitive altruism” and “green status seeking” highlight the role of others’ behavior for one’s own choice of green behaviors (Griskevicius et al., 2010; Sexton and Sexton, 2014; Welsch and Kühling, 2016).

Using a nationally representative panel data set of the UK population that contains information on 11 different pro-environmental behaviors, our research note contributes to the literature by studying how one’s own behavior is related to that of one’s peer group. We specifically find that (1) individuals’ own behavior is positively related to the average level of green behavior in different UK regions, which is consistent with the existence of peer pressure when it comes to green behavior. We also relate green behavior to green self-image and find (2) that one’s peers’ green behavior more strongly influences own green behavior, the greener one’s own self-image. Finally, we analyze the diversity (measured by fractionalization and polarization) of aggregate green behavior on a regional level and the extent to which this moderates the above peer effects by relaxing (or tightening) the pressure to conform to that behavior. Here we find (3), on the one hand, that greater fractionalization of PEBs in a region *ceteris paribus* decreases the intensity of one’s own green behavior, which would be consistent with a lower pressure to conform to a uniformly green norm. Increasing polarization, on the other hand, exerts the opposite effect, potentially through making norms more salient for the individual. Our analysis thus contributes to the yet ill-understood field of how individuals’ pro-environmental behavior is related to conformity to social norms and self-image.

## 2. Data and analysis

We use a representative survey of UK citizens' attitudes and household characteristics (Understanding Society Survey, UKHLS, University of Essex, 2015) incorporating extensive

	mean	sd	count
Sum index PEB	19.50	6.19	90694
Green self-image (GSI)	1.67	0.88	78914
No. PEBs reported	10.14	1.13	90694
GSI high ( $> 2$ )	0.14	0.35	98151
GSI low ( $< 2$ )	0.36	0.48	98151
Log(gross income, defl.)	7.07	1.26	92325
Disabled (y/n)	0.35	0.48	97983
First degree	0.22	0.42	97839
Higher degree	0.11	0.31	97839
A-level etc.	0.20	0.40	97839
GCSE etc.	0.21	0.41	97839
Other	0.10	0.30	97839
Living as couple	0.11	0.32	98023
Separated	0.02	0.14	98023
Divorced	0.06	0.24	98023
Widowed	0.06	0.24	98023
Single	0.23	0.42	98023
Self employed	0.07	0.26	98134
Unemployed	0.06	0.24	98134
Retired	0.21	0.41	98134
On maternity leave	0.01	0.08	98134
Family care or home	0.06	0.25	98134
Full-time student	0.07	0.26	98134
Lt sick or disabled	0.04	0.19	98134
Govt training scheme	0.00	0.04	98134
Unpaid, family business	0.00	0.03	98134
On apprenticeship	0.00	0.02	98134
Other	0.01	0.08	98134
No. kids: 1	0.12	0.33	98151
No. kids: 2	0.11	0.31	98151
No. kids: 3+	0.05	0.22	98151
Age	46.46	18.40	98151
Year dummy (2012/13)	0.48	0.50	98151
Female (y/n)	0.54	0.50	98151
Gov. Office Region = 1. North East	0.04	0.19	98122
Gov. Office Region = 2. North West	0.10	0.30	98122
Gov. Office Region = 3. Yorkshire and the Humber	0.08	0.27	98122
Gov. Office Region = 4. East Midlands	0.08	0.26	98122
Gov. Office Region = 5. West Midlands	0.08	0.28	98122
Gov. Office Region = 6. East of England	0.09	0.28	98122
Gov. Office Region = 7. London	0.14	0.35	98122
Gov. Office Region = 8. South East	0.12	0.32	98122
Gov. Office Region = 9. South West	0.08	0.27	98122
Gov. Office Region = 10. Wales	0.06	0.24	98122
Gov. Office Region = 11. Scotland	0.08	0.27	98122
Gov. Office Region = 12. Northern Ireland	0.05	0.22	98122
Observations	98151		

Table 1: Summary statistics. Source: UKHLS.

information on pro-environmental behaviors and attitudes in two of its seven panel waves. The UKHLS study started in 2009/2010, including 40,000 UK households and roughly 100,000 individuals (of 16 years and older).

We draw on waves 1 and 4 (years 2009/2010 and 2012/2013). After deletion of observations with missing values in the questions of interest, our sample size drops from 98,000 to roughly 75,000 responses from over 50,000 distinct individuals. Summary statistics are depicted in Table 1. Pro-environmental behaviors are elicited in the UKHLS via 11 questions about day-to-day resource use and conservation behaviors.<sup>1</sup>

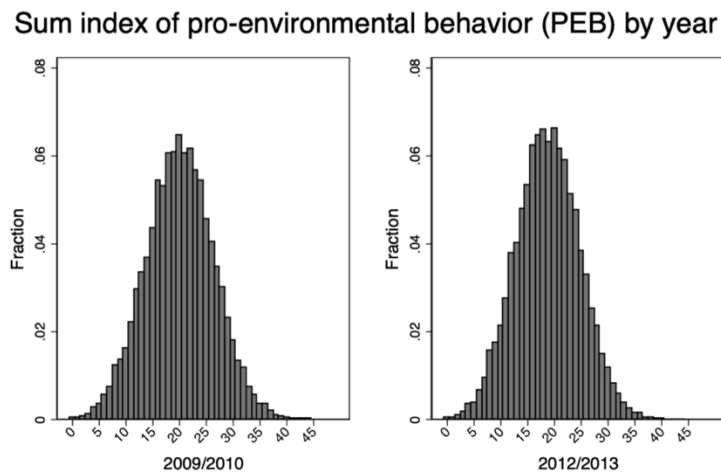


Figure 1: Sum index of pro-environmental behavior in both panel years. Source: UKHLS.

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<sup>1</sup> Respondents are asked: “Now a few questions about the environment. Please look at this card and tell me how often you personally do each of the following things”: “Switch off lights in rooms that aren’t being used”; “Put more clothes on when you feel cold rather than putting the heating on or turning it up”; “Decide not to buy something because you feel it has too much packaging”; “Buy recycled paper products such as toilet paper or tissues”; “Take your own shopping bag when shopping”; “Use public transport (e.g. bus, train) rather than travel by car”; “Walk or cycle for short journeys less than 2 or 3 miles”; “Car share with others who need to make a similar journey”; “Take fewer flights when possible”; “Leave your TV on standby for the night”; “Keep the tap running while you brush your teeth”.

Respondents can answer these on a Likert scale from 1 = “always”, to “very often”, “quite often”, “not very often” to 5 = “never” and “not applicable, cannot do this”. For some of these questions, the scale was reverse-coded in the questionnaire. In line with analyses in Binder and Blankenberg (2017) and Binder et al. (2019), we have consistently recoded the answers to range from 0 to 4 so that higher values represent higher levels of pro-environmental behavior.<sup>2</sup> We then aggregate these individual behaviors into a sum index of pro-environmental behaviors (PEBsum) by summing up the intensity of individual green behaviors (range 0 to 44, mean 19.5, sd 6.19).<sup>3</sup>

For green self-image, we draw on a “green lifestyle question”, where respondents are being asked to rate how they would describe their overall lifestyle with regard to environmental friendliness. Individuals respond to the question “[W]hich of these would you say best describes your current lifestyle?” on a five-point Likert-scale with answer going from “I don’t really do anything that is environmentally-friendly” (1, our base category), “I do one or two things that are environmentally-friendly” (2), “I do quite a few things that are environmentally-friendly” (3), “I’m environmentally-friendly in most things I do” (4) up to “I’m environmentally-friendly in everything I do” (5), which we recode to range from 0 to 4. Mean green self-image (GSI) is 1.67 (sd 0.88). Figure 1 shows the distribution of the sum index PEB variable and Figure 2 the green self-image variable, disaggregating them by the two panel years used. With regard to green self-image, we can see that most of the intertemporal variation is not on the extremes, but a slight shift from

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<sup>2</sup> We have also recoded the answer “not applicable” to “missing” so that the mean values in our summary statistics table (Table 1) reflect the mean level of environmentally-friendly behavior of those who are rating this behavior as applicable.

<sup>3</sup> To check the robustness of our results with regard to index construction, we also use a mean behavior index (PEBmean), where we divide the sum of intensities by the sum of applicable behaviors (mean index PEB, with mean 1.94, sd 0.63). Both indices are strongly correlated ( $r=.92^{***}$ , see Table 3) and results do not change much with index choice (results available on request).

doing one or two things towards doing a few things for the environment. Mean green self-image slightly increases from 1.65 to 1.70 during our panel horizon, whereas the sum index PEB decreases from 20.12 to 18.82 between the two years. For the analysis, we recode green self-image into a high green self-image dummy ( $GSI > 2$ ) and a low green self-image dummy ( $GSI < 2$ ) with the omitted base category consisting of those people who do “a few things” for the environment.

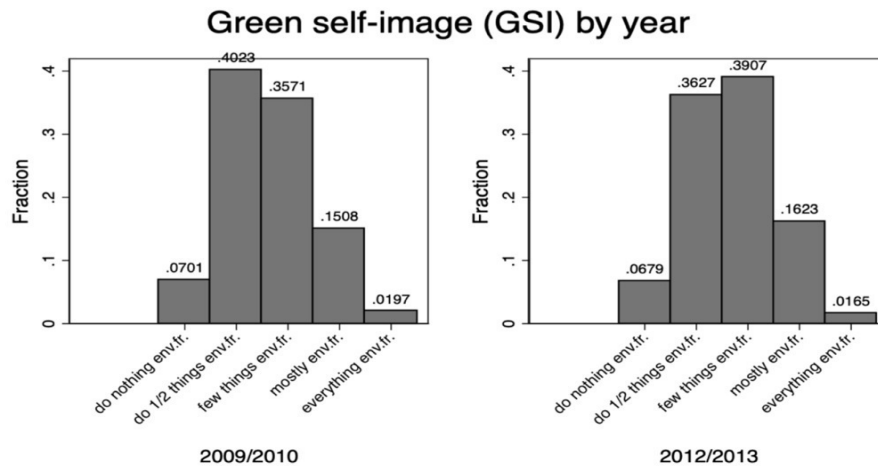


Figure 2: Green self-image (GSI) in both panel years. Source: UKHLS.

To explore the effects of green norms, we compute a set of aggregate variables for the green behavior index variable, all on the level of the UK’s twelve government office regions (per year). As measure of prevalence (PREV) of green behavior, we use the regional mean levels of green behavior. To operationalize regional diversity of pro-environmental behavior, we compute Rao’s quadratic entropy as measure of fractionalization (FRAC) and Esteban and Ray’s measure of polarization (POLAR; see Welsch and Kühling, 2018, for more discussion on these). Table 2 shows descriptive statistics for our prevalence and diversity measures, disaggregated by time period.



	overall				2009/2010				2012/2013			
	mean	sd	min	max	mean	sd	min	max	mean	sd	min	max
Sum index PEB (PEBsum)	19.505	6.186	0	44	20.125	6.323	0	44	18.821	5.956	0	44
Green self-image (GSI)	1.672	0.883	0	4	1.648	0.888	0	4	1.697	0.878	0	4
PREV PEB (year, region)	19.514	1.271	16.30	22.17	20.135	1.085	17.84	22.17	18.843	1.106	16.30	21.06
FRAC PEB (year, region)	6.841	0.354	6.368	7.692	6.825	0.332	6.368	7.692	6.858	0.377	6.389	7.614
POLAR PEB (year, region)	0.277	0.001	0.276	0.280	0.277	0.001	0.276	0.280	0.277	0.001	0.276	0.280
Observations	98151				50994				47157			

Table 2: Summary statistics: regional prevalence (PREV) and diversity (FRAC/POLAR) of pro-environmental behavior.

Our control variables include gross monthly income (deflated to 2015 GBP), age, age<sup>2</sup> (divided by 100) and marital status. For the latter, the question about the “de facto marital status” has been recoded into six categories (“married”, “living as couple”, “separated”, “divorced”, “widowed” and “single”). We also include dummy variables for different levels of education (“1st degree”, “other higher degree”, “A-level, etc.”, “GCSE, etc.”, “other qualification” and “none” being our base category), job status, an objective measure of health (being disabled), number of children (coded as a categorical variable, 1,2 or 3+ children), and regional dummies (government office regions). As the environmental variables of interest are only available in two waves/years (namely year 2009/2010 as well as 2012/2013), we also created a dummy variable for the later period (wave 4). Pearson correlations are depicted in Table 3, with no apparent issues of multicollinearity (correlations between the diversity measures are also below thresholds for multicollinearity; not shown in Table).

	Sum index PEB	Mean index PEB	GSI	PREV PEB	FRAC PEB	POLAR PEB	Log(inc.)
Sum index PEB	1.00						
Mean index PEB	0.92*** (0.0000)	1.00					
Green self-image (GSI)	0.29*** (0.0000)	0.28*** (0.0000)	1.00				
PREV PEB (year, region)	0.21*** (0.0000)	0.20*** (0.0000)	0.01 (0.1032)	1.00			
FRAC PEB (year, region)	-0.16*** (0.0000)	-0.15*** (0.0000)	-0.04*** (0.0000)	-0.79*** (0.0000)	1.00		
POLAR PEB (year, region)	-0.06*** (0.0000)	-0.05*** (0.0000)	-0.01*** (0.0001)	-0.31*** (0.0000)	0.38*** (0.0000)	1.00	
Log(gross income, defl.)	-0.04*** (0.0000)	-0.07*** (0.0000)	-0.01* (0.0132)	0.03*** (0.0000)	-0.04*** (0.0000)	-0.01* (0.0349)	1.00
Observations	98151						

p-values in parentheses

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

Table 3: Correlation: Pearson correlation coefficients.

We estimate FE OLS models, including year and regional dummies and clustering standard errors on the individual level. Individual pro-environmental behavior, as measured by the sum index of green behaviors (PEBsum) is our dependent variable throughout all models. Our results are presented in Table 4, showing how own green behavior is related to both one's regional peer's green behavior and own green self-image.<sup>4</sup> Model (1) shows that the intensity of green behavior is positively related to high green self-image positively ( $b=.60^{***}$ ) and decreases with low green self-image ( $b=-.46^{***}$ , both compared to the middle base category). Both effects should be considered small as they are less than a one-unit change on a dependent variable scaled from 0 to 44 (where a one-unit change would refer to increasing behavior intensity of one of eleven behaviors by one point, e.g. from "quite often" to "very often").

<sup>4</sup> Of the control variables, throughout our models, we find no association between green behaviors and income, and an association with some job statuses characterized by having more free time (being retired or unemployed for instance). We also present a table with the same models using a continuous variable for green self-image (see Table 5).

With regard to peer influences, we find a positive association between own behavior and the prevalence level of green behaviors in the individuals' region (PREV; mean level of PEB sum index,

	(1)		(2)		(3)		(4)		(5)	
	GSI high/low		PREV(PEB)		GSI*PREV(PEB)		FRAC(PEB)		POLAR(PEB)	
GSI low (< 2)=1	-0.46***	(-7.47)	-0.45***	(-7.38)	-0.31	(-0.33)	-0.45***	(-7.38)	-0.45***	(-7.44)
GSI high (> 2)=1	0.60***	(7.35)	0.60***	(7.32)	-3.00*	(-2.29)	0.60***	(7.37)	0.60***	(7.37)
PREV PEB (year, region)			0.72***	(6.65)	0.70***	(6.27)				
FRAC PEB (year, region)							-1.29***	(-6.38)		
POLAR PEB (year, region)									77.75**	(2.64)
GSI low (< 2)=1 x PREV PEB (year, region)					-0.01	(-0.15)				
GSI high (> 2)=1 x PREV PEB (year, region)					0.19**	(2.74)				
Log(gross income, defl.)	0.02	(0.53)	0.02	(0.52)	0.02	(0.53)	0.02	(0.54)	0.02	(0.54)
Disabled (y/n)	-0.23**	(-3.20)	-0.23**	(-3.21)	-0.23**	(-3.24)	-0.23**	(-3.19)	-0.23**	(-3.20)
First degree	0.26	(0.45)	0.23	(0.40)	0.24	(0.41)	0.24	(0.40)	0.24	(0.42)
Higher degree	-0.09	(-0.16)	-0.13	(-0.23)	-0.12	(-0.21)	-0.13	(-0.22)	-0.11	(-0.19)
A-level etc.	0.36	(0.69)	0.34	(0.65)	0.35	(0.67)	0.34	(0.65)	0.34	(0.65)
GCSE etc.	-0.21	(-0.43)	-0.22	(-0.46)	-0.21	(-0.44)	-0.22	(-0.46)	-0.22	(-0.45)
Other	0.38	(0.78)	0.38	(0.78)	0.38	(0.79)	0.37	(0.77)	0.38	(0.78)
Living as couple	-0.14	(-0.81)	-0.14	(-0.80)	-0.14	(-0.78)	-0.13	(-0.75)	-0.14	(-0.81)
Separated	0.48 <sup>+</sup>	(1.83)	0.46 <sup>+</sup>	(1.78)	0.47 <sup>+</sup>	(1.79)	0.48 <sup>+</sup>	(1.83)	0.47 <sup>+</sup>	(1.82)
Divorced	0.16	(0.61)	0.13	(0.47)	0.13	(0.49)	0.14	(0.54)	0.16	(0.60)
Widowed	0.14	(0.49)	0.15	(0.52)	0.15	(0.52)	0.14	(0.51)	0.13	(0.47)
Single	0.11	(0.45)	0.11	(0.45)	0.11	(0.47)	0.12	(0.48)	0.11	(0.47)
Self employed	0.31*	(2.00)	0.31*	(2.00)	0.32*	(2.03)	0.31*	(1.98)	0.31*	(1.98)
Unemployed	0.93***	(5.38)	0.92***	(5.33)	0.92***	(5.32)	0.93***	(5.34)	0.93***	(5.36)
Retired	1.13***	(7.74)	1.13***	(7.71)	1.13***	(7.74)	1.13***	(7.74)	1.13***	(7.73)
On maternity leave	0.31	(1.05)	0.30	(1.02)	0.30	(1.03)	0.31	(1.06)	0.30	(1.01)
Family care or home	0.46*	(2.57)	0.45*	(2.50)	0.45*	(2.50)	0.45*	(2.50)	0.46*	(2.55)
Full-time student	0.75**	(2.81)	0.75**	(2.80)	0.74**	(2.77)	0.75**	(2.80)	0.75**	(2.82)
Lt sick or disabled	0.51*	(2.07)	0.50*	(2.05)	0.50*	(2.06)	0.50*	(2.03)	0.51*	(2.06)
Govt training scheme	-0.64	(-0.64)	-0.68	(-0.69)	-0.68	(-0.70)	-0.71	(-0.72)	-0.66	(-0.67)
Unpaid, family business	0.85	(0.82)	0.84	(0.82)	0.87	(0.84)	0.84	(0.81)	0.84	(0.81)
On apprenticeship	5.86*	(2.00)	5.81*	(1.99)	5.80*	(1.98)	5.77*	(2.00)	5.82*	(1.97)
Other	0.36	(0.92)	0.36	(0.93)	0.36	(0.93)	0.37	(0.95)	0.36	(0.92)
No. kids: 1	-0.05	(-0.40)	-0.05	(-0.40)	-0.05	(-0.37)	-0.05	(-0.38)	-0.04	(-0.36)
No. kids: 2	-0.22	(-1.40)	-0.22	(-1.38)	-0.22	(-1.35)	-0.22	(-1.37)	-0.22	(-1.38)
No. kids: 3+	-0.48*	(-1.96)	-0.48*	(-1.98)	-0.48*	(-1.96)	-0.48*	(-2.00)	-0.48*	(-1.96)
Age	0.15	(1.20)	0.16	(1.24)	0.14	(1.11)	0.16	(1.29)	0.16	(1.22)
Age <sup>2</sup> /100	-0.07 <sup>+</sup>	(-1.77)	-0.07 <sup>+</sup>	(-1.93)	-0.06	(-1.58)	-0.08*	(-2.07)	-0.07 <sup>+</sup>	(-1.92)
Year dummy (2012/13)	-1.55***	(-4.14)	-0.72 <sup>+</sup>	(-1.84)	-0.71 <sup>+</sup>	(-1.80)	-1.54***	(-4.14)	-1.55***	(-4.14)
gor.dv==1. North East	-3.18**	(-2.60)	-0.83	(-0.65)	-0.84	(-0.66)	-2.04 <sup>+</sup>	(-1.65)	-3.46**	(-2.81)
gor.dv==2. North West	-1.51*	(-2.15)	0.34	(0.45)	0.33	(0.44)	-0.73	(-1.02)	-1.59*	(-2.26)
gor.dv==3. Yorkshire and the Humber	-2.13*	(-2.40)	-0.64	(-0.71)	-0.67	(-0.74)	-1.49 <sup>+</sup>	(-1.68)	-2.13*	(-2.40)
gor.dv==4. East Midlands	-1.25 <sup>+</sup>	(-1.85)	0.59	(0.81)	0.60	(0.82)	-0.51	(-0.74)	-1.34*	(-1.98)
gor.dv==5. West Midlands	-0.88	(-1.26)	1.26	(1.64)	1.25	(1.62)	0.20	(0.28)	-0.94	(-1.34)
gor.dv==6. East of England	-1.43*	(-2.52)	0.07	(0.12)	0.07	(0.11)	-1.11*	(-1.96)	-1.43*	(-2.53)
gor.dv==8. South East	-1.36**	(-2.91)	-0.19	(-0.39)	-0.20	(-0.40)	-1.31**	(-2.80)	-1.35**	(-2.90)
gor.dv==9. South West	-1.18 <sup>+</sup>	(-1.77)	-0.05	(-0.07)	-0.06	(-0.08)	-1.02	(-1.52)	-1.19 <sup>+</sup>	(-1.78)
gor.dv==10. Wales	-2.82*	(-2.53)	-0.90	(-0.79)	-0.89	(-0.78)	-2.27*	(-2.05)	-2.80*	(-2.52)
gor.dv==11. Scotland	-1.25	(-1.40)	0.64	(0.69)	0.63	(0.68)	-0.40	(-0.44)	-1.32	(-1.48)
gor.dv==12. Northern Ireland	-2.29	(-1.43)	0.93	(0.56)	0.87	(0.52)	-0.60	(-0.37)	-2.39	(-1.49)
Constant	15.60**	(2.70)	-0.43	(-0.07)	0.43	(0.07)	23.64***	(4.01)	-5.89	(-0.59)
Observations	85407		85407		85407		85407		85407	
R <sup>2</sup>	0.059		0.061		0.061		0.060		0.059	
F	38.44		38.42		36.75		38.17		37.56	
df <sub>r</sub>	59319.00		59319.00		59319.00		59319.00		59319.00	
r <sup>2</sup> <sub>a</sub>	0.06		0.06		0.06		0.06		0.06	

t statistics in parentheses

<sup>+</sup>  $p < 0.10$ , \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

Table 4: Regression Table: Peer effects. Dependent variable is the sum index of pro-environmental behavior. Fixed effect regressions with heteroscedasticity-robust standard errors clustered on the level of the individual. Data source: UKHLS.

b=.80\*\*\*, column 2). This means that for each point of greener peer behavior, an individual increases their green behavior by 80% of a point, a quite substantial peer influence.<sup>5</sup>

Looking now in more detail into the relationship between own behavior and others' actual green behavior, we not only find a strong association between both variables in the uninteracted model, but we also find a positive interaction term showing that the influence of one's green self-image on own green behavior increases in the level of regional green behaviors (PREV, column 3), i.e. when more people are acting in green ways, self-identifying as environmentally-friendly translates into more own green behavior (see also Figure 3, where we visualize this interaction

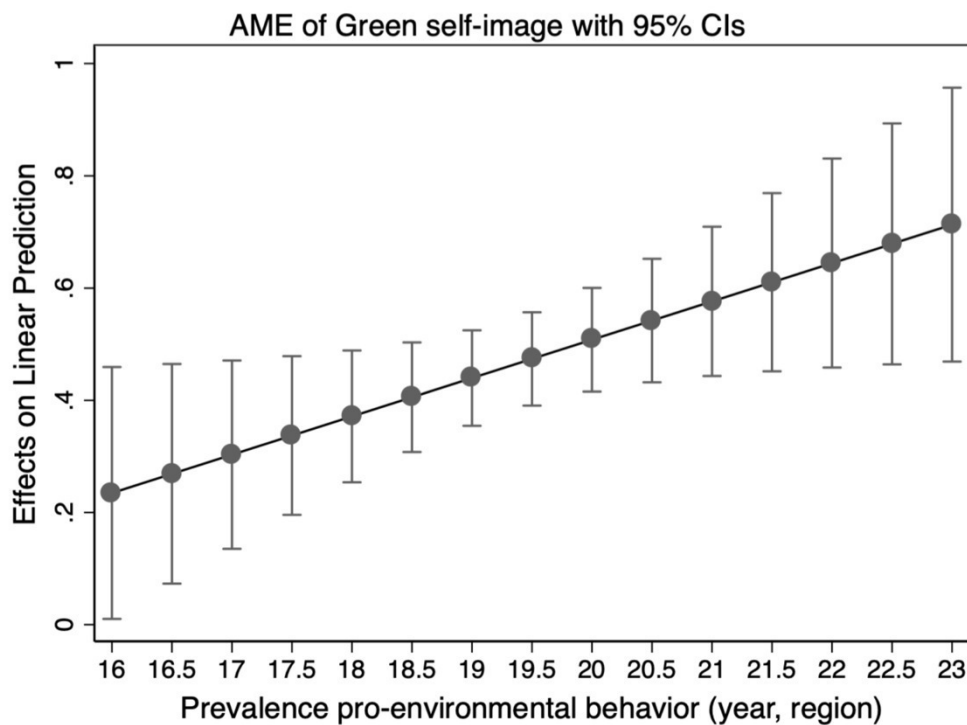


Figure 3: Interaction effects: Green self-image (GSI) x PREV PEB (year, region).

<sup>5</sup> All models are robust to inclusion of a mean green self-image variable on the regional level, which does not alter results compared to the more parsimonious models presented here.

for a continuous GSI variable). That others' green behavior is positively associated with own green behavior for those identifying as having a green self-image would be consistent with an explanation in terms of individuals trying to conform with prevailing norms and reacting to peer pressure, doing so more strongly the greener one self-identifies as.

Both measures of prevalence and of diversity (fractionalization & polarization) of green behaviors can be seen as reflections of the existence and strength of prevailing pro-environmental norms. With regard to diversity of peer behavior, we see that own green behavior is negatively related to fractionalization of regional green behaviors (column 4), but positively related to polarization. Thus, on the one hand, the more fractionalized green behavior in a given region, the less an individual will exhibit own green behaviors. This is compatible with an explanation in terms of less clear green norms leading to a diminished influence on individuals' green behavior. This interpretation is also bolstered by looking into polarization of green norms (column 5), where we find, on the other hand, that the more polarized a region is with regard to green behavior intensity, the higher the peer pressure effect, which could be due to green norms becoming more salient through the polarization.

Finally, interaction models between prevalence and diversity measures are, however, non-significant with regard to their association with green behavior (models not shown).

### 3. Discussion and conclusion

Explicitly modelling individuals' intensity of green behavior as a function of one's green self-image as well as regional peers' behaviors shows that the intensity with which individuals engage in green behaviors in the UK is robustly and positively associated with both one's self-image as

well as others' behavior. Our work sheds light onto the latter relationship insofar as it shows that not only mean aggregate peer behavior (as measured by the prevailing level of green behavior in a region, PREV) plays a role for individuals' decisions to engage in green behaviors, but also the distribution of said peer behavior. When peer behaviors are more varied, we see individuals committing less own green behaviors, which is compatible with green norms being less visible and less uniform and hence not as binding or pressure-inducing as when there would be less variety. High polarization of peer behavior, on the other hand, seems to increase the visibility or salience of existing norms and *ceteris paribus* exerts more pressure on the individual to act in accordance with green norms. Our paper here provides companion evidence to research on the well-being effects of peer green behavior (Binder et al., 2019), where the authors show that life satisfaction decreases with increasing prevalence of green behaviors (social pressure for non-greens and increasing status competition for greens) but increases the more diverse peer green behaviors are (pressures to conform are relieved).

While panel fixed effects regressions are not a foolproof method of identifying causal relationships between the variables of interest (i.e. we cannot rule out omitted time-varying influences biasing our estimates), it seems unlikely that reverse causality would be a major issue when it comes to regional-level influences: for an individual to impact on regional level aggregate behaviors, this would have to be a highly visible and influential individual. Our analysis thus provides evidence for peer effects on individual behavior, not vice versa. We would be more cautious with regard to the causal arrow in regard to green self-image however. In addition, a two-year panel data set with time periods spaced four years apart calls for further research with

better data to better understand the role of norms and peer behavior for own pro-environmental behavior.

(ca. 2300 words, 14.03.2019)

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	(1) GSI		(2) PREV(PEB)		(3) GSI*PREV(PEB)		(4) FRAC(PEB)		(5) POLAR(PEB)	
Green identity (GSI)	0.47***	(11.21)	0.47***	(11.11)	-0.86	(-1.39)	0.47***	(11.17)	0.47***	(11.20)
PREV PEB (year, region)			0.66***	(5.58)	0.55***	(4.25)				
FRAC PEB (year, region)							-1.13***	(-5.17)		
POLAR PEB (year, region)									63.00+	(1.95)
Green identity (GSI) x PREV PEB (year, region)					0.07*	(2.14)				
Log(gross income, defl.)	0.01	(0.19)	0.01	(0.17)	0.01	(0.18)	0.01	(0.20)	0.01	(0.19)
Disabled (y/n)	-0.15+	(-1.91)	-0.15+	(-1.92)	-0.15+	(-1.93)	-0.15+	(-1.90)	-0.15+	(-1.92)
First degree	0.27	(0.42)	0.25	(0.39)	0.24	(0.38)	0.24	(0.37)	0.25	(0.38)
Higher degree	-0.08	(-0.12)	-0.11	(-0.17)	-0.11	(-0.18)	-0.12	(-0.19)	-0.10	(-0.15)
A-level etc.	0.40	(0.69)	0.39	(0.67)	0.37	(0.64)	0.37	(0.64)	0.38	(0.65)
GCSE etc.	-0.18	(-0.33)	-0.19	(-0.35)	-0.20	(-0.37)	-0.20	(-0.37)	-0.20	(-0.37)
Other	0.13	(0.23)	0.12	(0.23)	0.11	(0.21)	0.10	(0.19)	0.12	(0.22)
Living as couple	-0.09	(-0.47)	-0.08	(-0.46)	-0.08	(-0.45)	-0.08	(-0.42)	-0.09	(-0.48)
Separated	0.64*	(2.27)	0.63*	(2.22)	0.63*	(2.22)	0.65*	(2.27)	0.64*	(2.26)
Divorced	0.34	(1.20)	0.31	(1.09)	0.31	(1.10)	0.32	(1.15)	0.33	(1.19)
Widowed	0.16	(0.49)	0.17	(0.51)	0.16	(0.48)	0.16	(0.50)	0.16	(0.48)
Single	0.13	(0.50)	0.13	(0.48)	0.13	(0.48)	0.14	(0.52)	0.13	(0.50)
Self employed	0.39*	(2.32)	0.39*	(2.32)	0.39*	(2.34)	0.38*	(2.31)	0.38*	(2.30)
Unemployed	0.93***	(4.97)	0.92***	(4.93)	0.92***	(4.92)	0.92***	(4.94)	0.92***	(4.95)
Retired	1.16***	(7.49)	1.15***	(7.47)	1.16***	(7.50)	1.16***	(7.51)	1.15***	(7.48)
On maternity leave	0.25	(0.77)	0.24	(0.75)	0.24	(0.76)	0.25	(0.78)	0.24	(0.74)
Family care or home	0.52**	(2.75)	0.51**	(2.69)	0.51**	(2.70)	0.51**	(2.69)	0.52**	(2.74)
Full-time student	0.58*	(2.03)	0.57*	(2.00)	0.57*	(1.99)	0.58*	(2.01)	0.58*	(2.03)
Lt sick or disabled	0.52+	(1.92)	0.53+	(1.95)	0.53+	(1.95)	0.52+	(1.92)	0.52+	(1.93)
Govt training scheme	-1.29	(-1.34)	-1.31	(-1.36)	-1.29	(-1.34)	-1.34	(-1.39)	-1.30	(-1.36)
Unpaid, family business	1.05	(0.87)	1.06	(0.89)	1.07	(0.90)	1.05	(0.88)	1.05	(0.87)
On apprenticeship	5.89*	(2.01)	5.85*	(2.00)	5.81*	(2.00)	5.82*	(2.01)	5.86*	(1.99)
Other	-0.06	(-0.15)	-0.06	(-0.14)	-0.06	(-0.16)	-0.04	(-0.11)	-0.06	(-0.14)
No. kids: 1	-0.00	(-0.03)	-0.00	(-0.01)	-0.00	(-0.01)	-0.00	(-0.00)	0.00	(0.01)
No. kids: 2	-0.16	(-0.91)	-0.16	(-0.91)	-0.16	(-0.91)	-0.15	(-0.90)	-0.15	(-0.90)
No. kids: 3+	-0.47+	(-1.79)	-0.47+	(-1.80)	-0.47+	(-1.81)	-0.47+	(-1.81)	-0.47+	(-1.78)
Age	-0.03	(-0.23)	-0.03	(-0.19)	-0.04	(-0.31)	-0.02	(-0.16)	-0.03	(-0.22)
Age <sup>2</sup> /100	-0.04	(-1.07)	-0.05	(-1.23)	-0.04	(-0.92)	-0.05	(-1.32)	-0.05	(-1.16)
Year dummy (2012/13)	-1.08**	(-2.64)	-0.33	(-0.77)	-0.31	(-0.72)	-1.08**	(-2.65)	-1.08**	(-2.64)
gor.dv==1. North East	-3.16*	(-2.48)	-0.98	(-0.74)	-0.97	(-0.73)	-2.13+	(-1.65)	-3.39**	(-2.64)
gor.dv==2. North West	-1.69*	(-2.10)	0.01	(0.01)	0.02	(0.02)	-1.00	(-1.23)	-1.75*	(-2.19)
gor.dv==3. Yorkshire and the Humber	-2.81**	(-2.86)	-1.46	(-1.45)	-1.48	(-1.46)	-2.26*	(-2.29)	-2.82**	(-2.86)
gor.dv==4. East Midlands	-1.59*	(-2.24)	0.09	(0.11)	0.10	(0.13)	-0.94	(-1.31)	-1.67*	(-2.34)
gor.dv==5. West Midlands	-1.16	(-1.53)	0.81	(0.98)	0.81	(0.98)	-0.20	(-0.25)	-1.21	(-1.60)
gor.dv==6. East of England	-1.67**	(-2.63)	-0.29	(-0.43)	-0.28	(-0.42)	-1.39*	(-2.19)	-1.67**	(-2.63)
gor.dv==8. South East	-1.47**	(-2.91)	-0.40	(-0.74)	-0.39	(-0.73)	-1.42**	(-2.82)	-1.47**	(-2.91)
gor.dv==9. South West	-1.39+	(-1.90)	-0.34	(-0.45)	-0.34	(-0.45)	-1.24+	(-1.69)	-1.40+	(-1.91)
gor.dv==10. Wales	-2.69*	(-2.14)	-0.93	(-0.72)	-0.91	(-0.70)	-2.21+	(-1.75)	-2.68*	(-2.13)
gor.dv==11. Scotland	-1.75+	(-1.86)	-0.02	(-0.02)	-0.00	(-0.00)	-1.01	(-1.06)	-1.82+	(-1.92)
gor.dv==12. Northern Ireland	-2.66	(-1.64)	0.28	(0.17)	0.26	(0.15)	-1.19	(-0.72)	-2.75+	(-1.69)
Constant	23.04***	(3.67)	8.43	(1.24)	10.98	(1.59)	30.14***	(4.71)	5.68	(0.52)
Observations	74595		74595		74595		74595		74595	
R <sup>2</sup>	0.064		0.065		0.066		0.065		0.064	
F	35.05		34.89		34.10		34.69		34.23	
df_r	53330.00		53330.00		53330.00		53330.00		53330.00	
r2_a	0.06		0.06		0.07		0.06		0.06	

*t* statistics in parentheses

+  $p < 0.10$ , \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

Table 5: Regression Table: Peer effects, green self-image modeled as continuous variable. Dependent variable is the sum index of pro-environmental behavior. Fixed effect regressions with heteroscedasticity-robust standard errors clustered on the level of the individual. Data source: UKHLS.