Journal of Business Research 144 (2022) 322–335

Contents lists available at ScienceDirect

Journal of Business Research

journal homepage: www.elsevier.com/locate/jbusres

Are consumers consistent in their sustainable behaviours? A longitudinal study on consistency and spillover

Michael Puntiroli [a,1,*], Lisa S. Moussaoui [b,2], Valéry Bezençon [a,1]

[a] Institute of Management, University of Neuchâtel, Switzerland
[b] Health Psychology Research Group, University of Geneva, Switzerland

ARTICLE INFO

Keywords:
Sustainable consumption
Pro-environmental behaviour
Temporal consistency
Spillover
Biospheric values
Habits

ABSTRACT

It is unclear whether knowledge about a customer's current sustainable behaviours, such as their choice of lightbulbs or travel mode, allows us to predict the sustainable behaviours they will carry out in the future. We address this in a large longitudinal study (N = 2177) where participants provided self-reports on electricity-, heating- and mobility-related consumption at two separate times, three years apart. The results highlighted a high level of *temporal consistency,* whereby carrying out one sustainable behaviour predicted consumers would be carrying out the same behaviour three years later. However, sustainable behaviours generally did not drive other different sustainable behaviours years later (i.e. no *spillover*). In fact, isolated instances of spillover emerged only between different kinds of mobility-related consumption among consumers with high environmental values. Overall, the findings indicate a high degree of consistency in sustainable behaviour even years apart, and limited spillover from one sustainable behaviour to another.

1. Introduction

Matthew always purchases eco-friendly light bulbs for his flat. Can we make assumptions about whether Matthew will continue to do so in the future? Can we expect that Matthew, several years from now, will also be turning off all appliances when he is not using them, and perhaps choosing also green forms of transport? It has been shown that people behave more sustainably if their environmental values are higher, if they have a greater openness to environmental change (Duchi et al., 2020), and if they think that society expects them to act in such a way (Cialdini, 2003) amongst other. Past research has pinpointed the psychological and social characteristics that predict whether a consumer will act sustainably or not. However, at a time when society has drastically evolved in relation to sustainable practices, we know less about whether carrying out a sustainable behaviour in the present will drive the same behaviour in the future. Sustainable choices and behaviours are those that are favoured because they are better for the environment than alternatives (Thøgersen & Ölander, 2002). In this context, what is especially unclear, is whether a consumer's sustainable behaviours in the present help drive other types of sustainable behaviours in the distant future. In other words, are we consistent in our sustainable behaviours over time? Do our sustainable behaviours spillover to other sustainable behaviours over time?

This paper investigates whether people display temporal consistency, which is the extent one behaviour drives the same behaviour in the future, and spillover, which is the degree of transfer between different sustainable behaviours separated by time. It also examines the role of biospherism, which is a psychological value centred upon a concern for environmental issues (de Groot & Steg 2008), in predicting consistency and spillover.

Overall, the previous studies that investigated this issue found that consumers remain relatively consistent in their sustainable behaviours over time (Thøgersen & Ölander, 2002) and that engaging in one type of behaviour rarely predicts future sustainable behaviour of a different kind, though high environmental values increase the likelihood of spillover (Thøgersen & Ölander, 2003). These studies have several limits. First, the timeframe used to study consistency and spillover was only 1 and 2 years respectively. Second, the sample used was relatively small. Third, and most importantly, the scientific findings that unearthed evidence of behavioural consistency over time, but not of

* Corresponding author.
E-mail address: michael.puntiroli@unine.ch (M. Puntiroli).
[1] Rue A.-L. Breguet 2, Institute of Management (IMN), Université de Neuchâtel, CH-2000, Neuchâtel, Switzerland.
[2] Boulevard du Pont d'Arve 40, Health Psychology Research Group, Faculty of Psychology and Education Sciences, Psychology Section, University of Geneva, Switzerland.

https://doi.org/10.1016/j.jbusres.2022.01.075
Received 17 November 2020; Received in revised form 19 January 2022; Accepted 23 January 2022
Available online 10 February 2022

spillover, were conducted almost 20 years ago, when public opinion on climate issues was different, and sustainable behaviours were less mainstream. Surveys continuously indicate that most consumers view climate issues as a matter of concern and recognize the necessity to act (Andi, 2020; Revkin, 2019), even leading sometimes to "eco-anxiety" (Panu, 2020; Verplanken et al., 2020). There is an urgent need to actualize research on consistency and spillover in the current context, characterized by a prevalence of sustainability issues discussed in the media and increased feasibility of sustainable behaviours. For example, sustainable products are more widely available in retail outlets (Bezençon & Etemad-Sajadi, 2015) and recycling is easier to carry out due to recycling centres and dedicated bins available for consumers. This new context makes sustainable behaviours more desirable and easier to switch to. As a result, one would expect the current context to be more conducive to spillover, particularly among individuals with high environmental values.

Research that came after Thøgersen and Ölander's effort shows inconsistent results. A *meta*-analysis by Maki et al. (2019) shows a small and positive spillover effect on intention, where the intention to perform one sustainable behaviour increases the intention to perform a different sustainable behaviour. The authors also find a small and negative spillover effect for actual behaviour, where performing one behaviour may in fact decrease the likelihood of performing a different sustainable behaviour. In fact, other studies on spillover also obtained inconsistent results (Brügger & Höchli, 2019; Höchli et al., 2019). Crucially, due to diverging conclusions, Maki et al. (2019) call for future studies to use larger samples.

In this research, we anchor our conceptual framework within the literature on habits (Ouellette & Wood, 1998; Wood & Rünger, 2016) to predict consistency of (non–)sustainable behaviours over time, and combine it with the literature on values (de Groot & Steg, 2007, 2008) to predict spillover. We test our predictions using a large field study on 2177 participants that measures energy-related consumption behaviours at two separate time points, three years apart. Our results show evidence of consistency in the sustainable behaviours consumers engage in, with all behaviours predicting the same behaviour in the future. We found ample evidence of sustainable behaviours remaining highly consistent over time. For certain sustainable behaviours we examined, the behaviour was reinforced over time when the consumers have high biospheric values. On the other hand, our findings suggests that spillover is a much rarer occurrence that occurs in some instances for highly biospheric individuals.

Our research has several contributions. First, most research on sustainable consumption focuses on punctiliously explaining what causes consumers to carry out single sustainable behaviour, coinciding with a lack of investigations aimed at understanding the complex relationships between these behaviours. Our research on spillover and consistency contributes to map the dependencies of sustainable behaviours over time. Also, by overcoming the difficulties entailed in measuring sustainable behaviours within the same large sample at two different moments years apart, we provide stronger evidence than previous studies and a better understanding of behavioural consistency and spillover. Finally, the limited spillover we observe, in particular among individuals with low biospheric values, provides insight into the conceptualization of sustainable behaviour as a unified versus multifaceted concept.

Understanding individuals' consistency and spillover in the sustainable consumption domain is important. At a time when most governments have set out clear goals related to sustainability, understanding how consistent consumers remain over time and how much their sustainable behaviours spill over onto other sustainable behaviours can have significant ramifications. For instance, our research can help understand whether it is suitable for governments and businesses to design a specific behaviour change intervention, in the sustainability domain, with intent to also stimulate different sustainable behaviours in the future (e.g. for a company seeking to increase cross-selling). Our research also provides insights for businesses interested in understanding changes in sustainable purchasing patterns (or lack thereof) of their consumers. It also shows governments and NGOs that increasing consumers' biospheric values is key to enable emulation of sustainable behaviours. Overall, this knowledge is important to encourage sustainable consumption, and eventually, mitigate climate change.

The remainder of this paper is organized as follows. Section 2 documents the literature on consistency and spillover in relation to sustainable consumption, then moves onto the potential moderating effect of psychological values on consistency and spillover. Section 3 presents the method, while Section 4 presents the results by examining consistency and spillover for individual behaviours as well as their aggregates. Finally, Section 5 concludes by highlighting the theoretical and practical contribution of the findings.

2. Conceptual framework

2.1. Defining temporal consistency and spillover of sustainable consumption

In this section we define the concepts of consistency and spillover by drawing upon frameworks from the academic literature that examine a multitude of sustainable behaviours. Thøgersen and Ölander (2003) define spillover as a transfer from one behaviour to another distinct behaviour, as could occur if an individual who engages in recycling feels compelled to begin buying organic food. Similarly, Truelove et al. (2014) define spillover as the transfer from one behaviour onto other behaviours that were not directly targeted by an intervention.

Thøgersen and Ölander questioned whether engaging in different behaviours that are however conceptually almost identical, can rightfully be defined as spillover, such as recycling paper and then glass. They suggest referring to "consistency" when discussing the relationship between behaviours that are part of the same category or class. An example of consistency would involve switching off different electrical goods when unneeded. Nilsson et al. (2017) presented their own framework distinguishing spillover across behaviours, across time, and across contexts. Referring to Nilsson et al. and Thøgersen and Ölander terminologies, in this paper we study temporal consistency, referring to whether performing one behaviour at time 1 affects the probability of performing the same behaviour at time 2, and spillover, referring to whether performing one behaviour at time 1 affects the probability of performing another conceptually distinct behaviour at time 2.

2.2. Habits predicting temporal consistency

It has been suggested that consumers act in highly predictable ways, at least in the long run, when examining patterns of similar behaviours over many months, such as visiting shops and department stores (Krumme et al., 2013). Temporal consistency finds strong support in the literature on habits, showing that the more individuals create recurrent patterns of behaviour the more these become reinforced, which makes breaking away from such engrained behaviours difficult (Ouellette & Wood, 1998; Wood & Rünger, 2016). In fact, the more a behaviour becomes habitual the less cognitive control is exerted over that behaviour (Cooper et al., 2014), with instances of habitual daily consumption (e.g. watching TV or eating at a fast food) shown to be imbued with little intention and control (Ji & Wood, 2007), increasing the chances of such behaviours continuing over time. In other words, habits, which are "learned dispositions to repeat past responses" (Wood & Neal, 2007p. 843), drive behavioural consistency.

Sustainable consumption is mostly repeated and occurs in recurring contexts. For instance, cooking with or without lids, turning off lights, taking long or short showers, taking public transport, are all repeated regularly in stable contexts, which create and strengthen habits (Ouellette & Wood, 1998; Wood & Rünger, 2016). Thus, we expect that

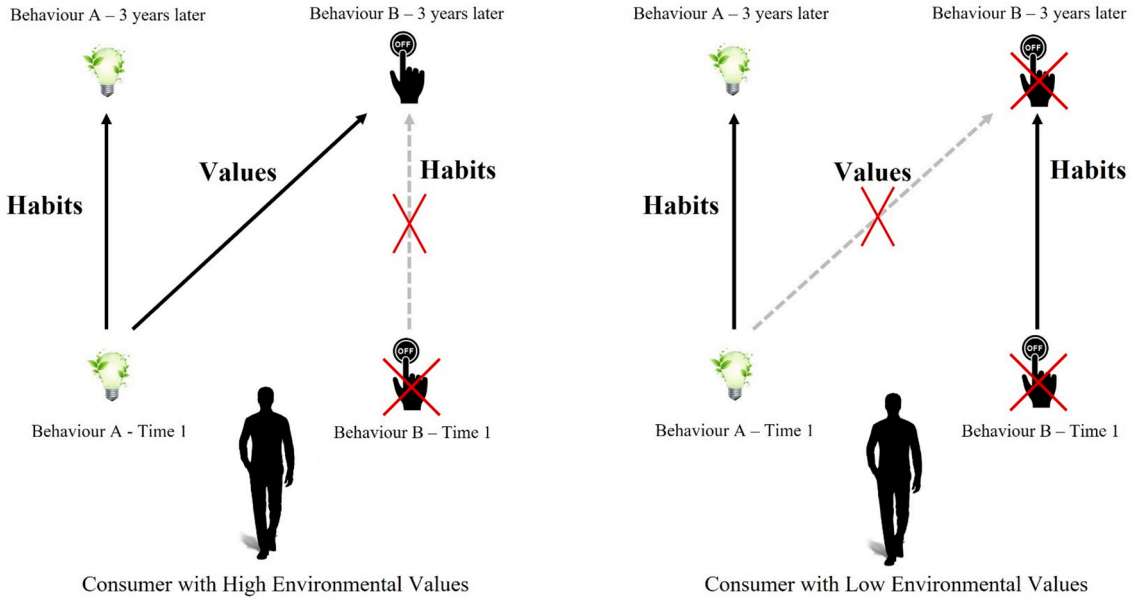

Fig. 1. Two contrasting examples of predicted consumer behaviour. On the left, a consumer with high environmental values (i.e. biospherism) is expected to remain temporally consistent in their sustainable behaviour, even years apart. This is exemplified by their choice of eco-bulbs at Time 1 and their choice also of eco-bulbs three years later. This consumer would also be expected to display spillover, meaning that their choice of eco-bulbs at Time 1 might lead them to begin switching off appliances not in use, years later. In other words, their act of sustainable consumption is expected to extend to other acts of sustainable consumption in the future. On the right, a consumer with low environmental values is expected to perform the same sustainable behaviours over the years, by force of habit. However, their low environmental values are expected to not facilitate their performing of new sustainable behaviours. For that reason, sustainable behaviours that were not performed at Time 1 (in the example, not switching off appliance not in use) will not be influenced by the performance of another green behaviour (choice of eco-bulbs) and will continue to not be performed three years later; thus, no spillover will be displayed.

sustainable behaviours remain consistent over time. Crucially, a high degree of consistency within consumers carrying out sustainable behaviours was previously found in two comprehensive studies (Thøgersen & Ölander, 2002, 2003), albeit with a fairly limited temporal range and participant sample. In these studies, the choices consumers made varied very little over time, with consumers who purchased environmentally friendly brands or organic products continuing to do so, from one year to the next. The context related to access, desirability and feasibility of sustainable consumption has evolved between these studies and ours. However, there is no reason to believe that the new context is less conducive to temporal consistency, once habits related to sustainable consumption are established. We therefore hypothesize:

H1 *Sustainable behaviour in the present predicts the same behaviour in the future* (i.e. *temporal consistency).*

2.3. Values predicting temporal consistency and spillover

Psychological values that consumers harbour can be particularly interesting when considering sustainable behaviours. Biospheric values are a particular type of psychological value defined as a concern with the quality of nature and the environment for its own sake, without a clear link to the welfare of other human beings (Steg et al., 2014). They can be thought of as environmental values. Though biospherism was initially investigated by Steg and de Groot (2012), the original conceptualization of this value builds upon an earlier value theory by Schwartz (1992, 1994). Unsurprisingly, biospherism usually leads to increased sustainable consumption, either by encouraging the choice of sustainable products or encouraging the curtailment of resources (Abrahamse & Steg, 2011; Chan, 2020; de Groot & Thøgersen, 2012; Karp, 1996; Nordlund & Garvill, 2002; Schultz et al., 2014). For instance, it was shown that highly biospheric individuals are more likely to act sustainably in their household, reducing energy consumption (Henn et al., 2019) especially when given enough time to implement household changes (Puntiroli & Bezençon, 2020).

2.3.1. Biospherism and consistency

The link between biospherism and isolated instances of sustainable consumption has been well documented. In this paper, we suggest that biospherism leads to greater temporal consistency of sustainable behaviours. We believe that biospherism can help consolidate habits that have a positive environmental impact, thus leading to temporal consistency. First, a habit typically originates in goal pursuit (Ouellette & Wood, 1998; Wood & Neal, 2007). Since biospheric values are long-term goals that relate to the environment, individuals holding higher biospheric values are more likely to establish sustainability-related habits than other individuals, leading to more temporal consistency of sustainable behaviours. In additions, sustainable behaviours have become more salient in today's environment. Indeed, sustainability is a key topic in the media; it is more visible (e.g. recycling bins) and related behaviours are more widely adopted in society; it is also more visible in the purchase environment with more opportunities to buy sustainable products. Biospheric individuals are more likely to seek contexts where they will be exposed to sustainable cues. For instance, they are more likely to read sustainability-related articles or to find themselves in retail outlets with large sustainable product offerings. Since habits are triggered by contextual cues and then reinforced with repetition (Wood and Neal 2007), people holding higher biospheric values are more likely to develop sustainability-related habits and thus show temporal consistency in their sustainable behaviours than people holding lower biospheric values.

We therefore hypothesize that:

H2 *Biospheric values increase the likelihood that sustainable consumption will be consistent over time*

2.3.2. Biospherism and spillover

Habits can be so engrained that they can at times resist conflicting values. Verplanken et al. (2008) show that university employees with more environmental concern were on average not less likely to use a private car to go to the campus than less environmentally concerned employees. However, more environmentally friendly employees who

were given the opportunity to resynchronize their behaviours with their values through a relocation, were less likely to use private cars than less environmentally concerned employees. Context change (e.g. relocation, retirement, change of job, change in marital status, birth of a first child) increase the likelihood that biospheric individuals synchronize their habits with their values by updating past behaviours or adopting new sustainable behaviours (Wood, 2019). In addition, the evolution of the context related to environmental issues (compared to 20 years ago) has decreased frictions on sustainable behaviours. For instance, sustainable behaviours have become more socially acceptable; Shops and supermarkets have greatly increased the number of sustainable products on offer. Limited frictions on sustainable behaviours makes them easier to adopt (Wood 2019). Hence, spillover is eased in our current environment. Overall, individuals holding higher biospheric values are more likely to update their non-sustainable behaviours to sustainable behaviours because they will, over time, synchronize their behaviours with their long-term goals (i.e. biospheric values) and this process will be eased in a context with limited friction. See Fig. 1 for a graphical depiction of the concepts.

In addition, it is known that individuals pay more attention to items that are more socially, visually or emotionally prominent, while ignoring those that are unremarkable (see perceptual salience; Taylor & Fiske, 1975). For example, recycling points present in one's neighbourhood are expected to become more salient to consumers within a social context of environmental awareness. In fact, an effective way to decrease engagement in undesirable behaviours is to increase the salience of desirable behaviours (Wansink & Sobal, 2007). This increased salience of sustainable behaviours should be especially strong for consumers whose psychological values make them sensitive to environmental issues. With environmentally concerned individuals being more preoccupied by issues surrounding sustainable consumption, they are more likely to take advantage of novel opportunities to engage in sustainable consumption, from eco-bulbs sold in shops to bicycle lanes. We therefore expect that environmentally conscious consumers engaging in a specific sustainable behaviour will move onto engaging in other sustainable behaviours at a later point in time. We hypothesize the following:

H3 *Sustainable behaviour in the present will transfer to different forms of sustainable behaviour in the future (*i.e. *positive spillover) among consumers with high biospheric values.*

3. Method

3.1. Participants

The data was collected in April-May 2016 and April-June 2019 as part of a research network called SCCER CREST, which spans several major academic institutions in Switzerland and investigates the determinants of residential energy consumption (Weber et al., 2017). The participant sample for the current investigation are those 2177 returning participants whose data was collected at both 2016 data collection and 2019 data collection. This three-year timeline of investigation finds support in the literature. In fact, Thøgersen and Ölander (2003) state that more than a single year is needed to observe changes in broad patterns of behaviour. Furthermore, Puntiroli and Bezençon (2020) found that a minimum of three years was needed for environmentally conscious people to make meaningful conservation changes in their household, when they installed a smart meter. All participants were recruited via a panel provider, answered the survey online and were compensated for their efforts. At T1, the average age of the sample was 48.06 (SD = 15.37), with the youngest respondent being 18 and the oldest 85. At T2, the average age is logically 3 years more (M = 51.1, SD = 15.40). In terms of gender repartition, at T1 54.6% of the respondents were male and 45.4% female (at T2: 54.3% male, 45.7% female). 59.5% of respondent were tenant of the place they lived in, and 40.5% were owners.

According to data from the Federal Statistical Office (FSO), in 2019 the ratio male/female in the country was 49.6% male, and 50.4% female (respectively 49.5%/50.4% in 2016). Thus, our sample is slightly biased towards men. National data in 2019 indicates that the average age in the Swiss population is 42.5 years. Our sample is understandably older due to the exclusion of children. Concerning the type of residency, in 2016 56.2% of the population was tenant, and 38.2% owner. Our sample reflects rather well this distribution. The survey was offered in three languages and the respondents could choose among German, French or English versions.

3.2. Procedure

In common parlance, the entire class of sustainable behaviours that consumers make can be subdivided into heating, electricity and transport choices, with these three broad groups also being used in the academic literature (Burger et al., 2015). We examined six energy-related behaviours: two electricity-related behaviours, two heating-related behaviours and two mobility-related behaviours. Focus was on behaviours that offered respondents an extent of decision-making freedom, where choices would be at least partly driven by one's psychological drivers and less constrained by external circumstances.

Truelove et al. (2014) highlighted that behavioural similarity can be a moderating factor increasing spillover. Thus, we will investigate temporal consistency and spillover using two levels. Level 1 relates to the predicting of specific behaviours, e.g. switching-off appliances predicting itself in the future (temporal consistency) and the predicting of different behaviours of the same kind, e.g. switching-off appliances predicting type of light bulb use in the future (spillover). Level 2 relates to the predicting of aggregate behaviours, e.g. aggregate of electricity behaviours predicting itself in the future (temporal consistency) and the predicting of different aggregate behaviour, aggregate of electricity behaviours predicting aggregate of mobility behaviours in the future (spillover). Also using aggregates of different behaviours from different situations is advantageous because psychological constructs (e.g. attitudes) are usually better predictors of aggregates than individual behaviours (Ajzen, 1991; Fishbein & Ajzen, 1974). We therefore use individual behaviours and behaviour aggregates in the current investigation. Next is reported a summary of the research items.

3.3. Research items

Pertaining to **electricity-related behaviour,** we asked respondents how often they switch-off five different appliances, which were: television, coffee machine, computer, internet router, and smartphone[3]. For each of these, if they were owned, respondents' answers could range from 1 = *never*, to 4 = *often*. We also asked respondents about their choice of light bulbs, by asking "What type of bulbs do you usually use in your residence?", then requiring an answer for Conventional, Energy-Saving and LED. The answer options were 1 = *none*, 2 = *some*, or 3 = *only this type of bulb*. We recoded the answer to these items so that people using only LED and/or energy-saving bulbs had the highest score (4 = *the most environment-friendly choice*), then very frequently LED and/or energy-saving bulbs (3), then less frequently LED and/or energy-saving bulbs (2), and finally those only purchasing conventional bulbs (1 = *the least environment-friendly choice)*. Each item was normalized, therefore ranging from 0 to 1. We then computed the electricity-aggregate scores, averaging the turning off score and choice of bulbs type.

For **heating-related behaviour**, respondents were first asked "Do you set heating at a different temperature during day and night?" and

[3] Participants only answered these items for appliances they stated they own. Thus, some individuals answered all five items, while others answered only four or less. We calculated the mean score for this behaviour on the items answered by participants, given they answered at least two out of the five.

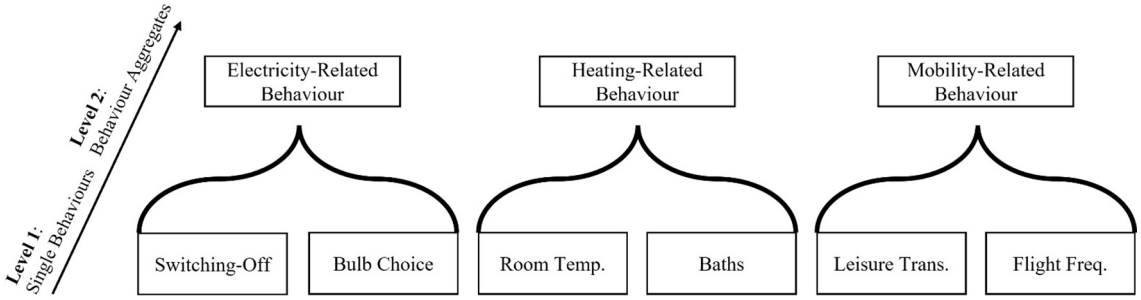

Fig. 2. Illustration of the behaviours used in the analysis and how these behaviours relate to one another. In the lowest section of the figure (Level 1) are depicted the single behaviour types, with two behaviour types related to electricity, two related to heating, and two related to mobility. The analysis at this bottom stage examined temporal consistency and spillover from one behaviour to another. In the upper part of the figure (Level 2) are the behavioural aggregates, with each grouping comprising two single behaviours. Investigations into temporal consistency and spillover at this upper stage examined the relationship between these behaviour aggregates.

"Do you turn down heating when you are away for some days (vacations, …)?". Both these items presented dichotomous answers, as 1 = *yes* or 0 = *no*, and were summed to represent the first behaviour-type for heating (scale ranging from 0 = *the least environment-friendly choices* to 2 = *the most environment-friendly choices)*. Respondents were then asked "On average, how many baths are taken per week in your household?", representing the second behaviour-type for heating and offering respondents the possibility of stating the exact number they regarded as correct up to 99. In order to obtain a cleaner measure of central tendency where the effect of extreme values is reduced we performed a 5% winsorizing of the data (Wilcox, 2011) on this item. The procedure sets all values below the 5th percentile of the distribution to the value located at the 5th percentile (here: 0), and all values above the 95th percentile to the value at the 95th percentile (here: 4). We proceeded to normalize each variable. We then averaged the room temperature variable with the number of baths variable, which was winsorized and reversed (so people who take fewer baths, i.e. more environment-friendly, have a higher score), in order to create a heating-aggregate score.

For **mobility-related behaviours,** respondents were asked what mode of transportation they mainly use for leisure activities, differentiating between green (bike, foot, public transport, recoded as = 2) and non-green (private car, motorbike, coded = 1)[4], and the amount of short to medium flights they took the previous year, with options ranging from *0* to *5 or more*. The number of flights was reversed-scored so that for the mobility-aggregate score, consisting in the average of both items, a higher score represented more environment-friendly choices. Both variables were normalized.

We measured biospherism using the scale initially developed by Schwartz (1992), and later adapted by de Groot and Steg (2007, 2008). The scale gauges biospherism thanks to 12 items and employs a 5-point Likert scale (ranging from 1 = *not important* to 5 = *extremely important*). The measure indicated satisfactory reliability (alpha = 0.871).

We also collected demographic data which we use as control variables throughout all analyses. These control variables were age, income, sex, household size (i.e. number of members in the household), and residency type (tenant = 1; owner = 2). The inclusion of these control variables was particularly crucial when analysing highly context-dependent sustainable behaviours, such as number of baths per household. We also controlled for other psychological values, namely egoism and hedonism. Egoistic values relate to a focus on one's personal costs and benefits when making choices (Steg et al., 2014), while hedonistic values are defined as pleasure or sensuous gratification for oneself (Schwartz, 1992). The choice of controlling for egoism and hedonism was driven by the fact that there is some literature on the association between those values and sustainable behaviours (egoism: Aoyagi-Usui et al., 2003; de Groot & Steg, 2009; hedonism: Doran, 2009; Olsen et al., 2012). The scale was the same as used for biospherism. Each value had satisfactory reliability (egoism: alpha = 0.761; hedonism: alpha = 0.757). All variables and measurements used can be seen in their original form in Table A1.

Table 1
Descriptive statistics (Non-Normalized Scores).

	N	Mean	SD	Min.	Max.
Biospherism 2016	2177	4.09	0.71	1	5
Egoism 2016	2177	2.80	0.71	1	5
Hedonism 2016	2177	3.73	0.75	1	5
Bulb type choice score 2016	2171	3.18	0.80	1	4
Bulb type choice score 2019	2172	3.36	0.76	1	4
Turning off behaviour score 2016	2113	3.14	0.58	2	4
Turning off behaviour score 2019	2169	2.83	0.74	1	4
Heating temperature score 2016	2177	1.39	0.71	0	2
Heating temperature score 2019	2177	1.33	0.71	0	2
Greenness score of bath 2016	2102	3.44	0.91	1	4
Greenness score of bath 2019	2096	3.49	0.86	1	4
Leisure transport mode score 2016	2108	1.54	0.50	1	2
Leisure transport mode score 2019	2082	1.53	0.50	1	2
Greenness score of short flights 2016	2177	3.84	1.42	0	5
Greenness score of short flights 2019	2177	3.97	1.39	0	5

Single behaviours and behaviour aggregates are presented in Fig. 2. We tested whether the extent to which individuals act sustainably in 2016 explained sustainable behaviour three years later, in 2019, and the extent to which biospheric values moderated this relationship. All dependent variables except for one were continuous scales of sustainable behaviour (i.e. the higher the more sustainable), while one variable was dichotomous. One of the most powerful ways of assessing the predictive power of a set of predictors on a criterion variable (the dependent variable) is through regression-based modelling. This class of methods allows to estimate the number of unit increases of a given predictor while all other predictors are kept constant (Coolican, 2004). In order to ascertain whether behaviours predict themselves and whether they predict different behaviours we ran a series of General Linear Models (GLM). Analysis was conducted in SPSS 25 and figures were produced using the package ggplot2 (Wickham, 2016) in R (R Core team, 2018).

4. Results

4.1. Descriptives

Descriptives of the frequencies of each behaviour considered in this

car-sharing was also a possible answer to this item, but only 2 people selected it.

Motobike was a response option only in 2019, not in the 2016 survey (7 people choose this option in 2019). 5 people answered "other". These 14 answered were coded as missing.

Table 2
LEVEL 1 - Electricity. Main effects of values on 2019 behaviours, consistency and spillover.

Predictors	Electricity-Related Behaviours 2019	
	Turning off electrical apparels	Type of bulbs choice
Biospherism	$\mathbf{F = 10.90, p = .001\ \eta^2_p = .005}$	$F = 0.39, p = .530, \eta^2_p = .000$
Turning off electrical apparels 2016	$\mathbf{F = 17.66, p < .001, \eta^2_p = .008}$	$F = 0.10, p = .749, \eta^2_p = .000$
Type of bulbs choice 2016	$F = 1.02, p = .312, \eta^2_p = .000$	$\mathbf{F = 26.35, p < .001, \eta^2_p = .012}$
Interac Bios*Turn off_16	$F = 1.58, p = .209, \eta^2_p = .001$	$F = 0.00, p = .964, \eta^2_p = .000$
Interac Ego*Turn off_16	$F = 1.99, p = .158, \eta^2_p = .001$	$F = 0.00, p = .981, \eta^2_p = .000$
Interac Hedo*Turn off_16	$F = 0.13, p = .715, \eta^2_p = .000$	$F = 0.21, p = .647, \eta^2_p = .000$
Interac Bios*Bulbs_16	$\mathbf{F = 6.11, p = .014, \eta^2_p = .003}$	$F = 0.10, p = .749, \eta^2_p = .000$
Interac Ego*Bulbs_16	$F = 0.03, p = .875, \eta^2_p = .000$	$F = 0.05, p = .831, \eta^2_p = .000$
Interac Hedo*Bulbs_16	$F = 0.13, p = .715, \eta^2_p = .000$	$\mathbf{F = 5.50, p = .019, \eta^2_p = .003}$

Note: Blue cases represent temporal consistency effects (behaviour A 2016 to behaviour A 2019). Yellow cases represent spillover effects (from behaviour A 2016 to behaviour B 2019). In bold = significant at p < .05

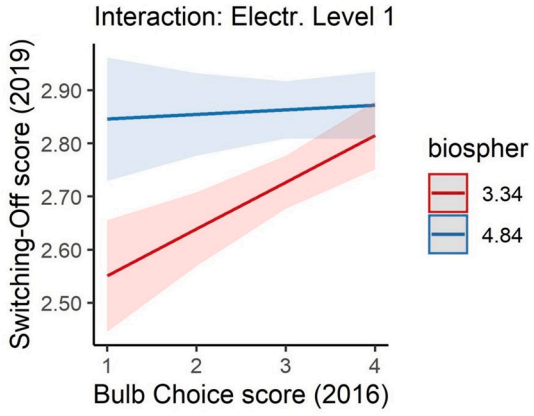

Fig. 3. Interaction effects between choice of bulbs for one's residence in 2016 and biospheric values predicting switching off appliances in 2019. The graph represents data adjusted for age, income, sex, household size, residency type, competing values and competing behaviours at the same level. Biospheric values are illustrated at cut-off points set at 1 Standard Deviation above (blue) and below (red) the mean. Coloured shaded areas represent the marginal effects of the regression models.

study are presented in Table 1. All scores have been coded so higher levels correspond to more environment-friendly behaviour (e.g. a value of 4 on "bath frequency score" means the persons took 0 bath).

4.2. Level 1: Within a Behaviour-Type

4.2.1. Electricity

First, we observed the relationship between the switching off of appliances and the choice of bulbs used in one's home. We sought to determine whether temporal consistency and spillover were present for these electricity-related behaviours. To do that we ran a General Linear Model multivariate analysis with choice of bulbs and switching off behaviour in 2019 as dependent variables, and their 2016 counterparts, biospheric score and control variables as predictors. Results are presented in Table 2.

Table 3
LEVEL 1 - Heating. Main effects of values on 2019 behaviours, temporal consistency and spillover.

Predictors	Heating-Related Behaviours 2019	
	Baths	Room temperature
Biospherism	$\mathbf{F = 6.99, p = .008, \eta^2_p = .003}$	$F = 0.17, p = .680, \eta^2_p = .000$
Baths 2016	$\mathbf{F = 17.12, p < .001, \eta^2_p = .008}$	$F = 1.00, p = .317, \eta^2_p = .000$
Room temperature 2016	$F = 0.35, p = .556, \eta^2_p = .000$	$\mathbf{F = 14.46, p < .001, \eta^2_p = .007}$
Interac Bios*Bath_16	$\mathbf{F = 4.22, p = .040, \eta^2_p = .002}$	$F = 0.06, p = .814, \eta^2_p = .000$
Interac Ego*Bath_16	$\mathbf{F = 7.29, p = .007, \eta^2_p = .004}$	$F = 0.11, p = .743, \eta^2_p = .000$
Interac Hedo*Bath_16	$F = 2.64, p = .105, \eta^2_p = .001$	$F = 1.17, p = .280, \eta^2_p = .001$
Interac Bios*Room Temp_16	$\mathbf{F = 3.85, p = .050, \eta^2_p = .002}$	$F = 2.67, p = .102, \eta^2_p = .001$
Interac Ego*Room Temp_16	$F = 0.04, p = .840, \eta^2_p = .000$	$F = 0.24, p = .624, \eta^2_p = .000$
Interac Hedo*Room Temp_16	$F = 1.71, p = .191, \eta^2_p = .001$	$F = 2.74, p = .098, \eta^2_p = .001$

Note: Blue cases represent temporal consistency effects (behaviour A 2016 to behaviour A 2019). Yellow cases represent spillover effects (from behaviour A 2016 to behaviour B 2019). In bold = significant at p < .05.

4.2.1.1. Electricity – Temporal consistency. Evidence emerged of temporal consistency for both electricity behaviours: the choice of type of bulbs in 2016 predicted the choice of bulbs in 2019, and switching off behaviour in 2016 predicted the same behaviour in 2019.

4.2.1.2. Electricity – Temporal consistency moderated by environmental values. No significant interaction effects emerged between bulb choice and biospherism predicting future bulb choice.

4.2.1.3. Electricity – Spillover moderated by environmental values. An interaction effect emerged between choice of bulbs and biospherism statistically predicting the future switching off of appliances. Post-hoc analyses were conducted investigating the interaction at different levels of the moderator variable, when this was 1 SD above or below the mean. This revealed that at low levels of biospheric values there was a positive effect of X on Y, $b = 0.08$, $t = 3.91$, $p < .001$, 95% CI [0.04; 0.12], but not at high levels of biospheric values, b less than 0.01, $p = .994$, as these appeared to lead to consistent high levels of sustainable behaviour (see Fig. 3).

4.2.1.4. Electricity – Summary. In summary, individuals with relatively low levels of biospherism showed spillover from bulb choice in 2016 to switching off behaviour in 2019, while a ceiling effect seem to emerge in respondents with high levels of biospherism.

4.2.2. Heating

Next, we turned to analyze behaviours that fell under the header of "heating". The two behaviours of interest were the heating of rooms and frequency of baths taken within the household. We ran a General Linear Model multivariate analysis with heating of rooms in 2019 and number of baths as dependent variables, and their 2016 counterparts, biospherism and demographic variables as predictors (results reported in Table 3).

4.2.2.1. Heating – Temporal consistency. We observed **temporal consistency** of both behaviours in the heating category: heating of the rooms predicted the same behaviour in 2019, and bath-taking in 2016 predicted frequency of bath-taking in 2019.

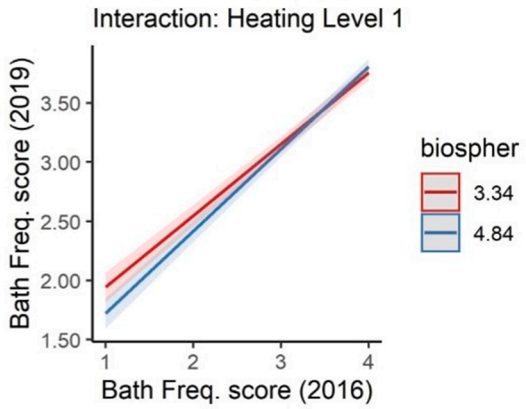

Fig. 4. Interaction effects between frequency of baths taken in 2016 and biospheric values predicting frequency of baths in 2019. The graph represents data adjusted for age, income, sex, household size, residency type, competing values and competing behaviours at the same level. Biospheric values are illustrated at cut-off points set at 1 Standard Deviation above (blue) and below (red) the mean. Coloured shaded areas represent the marginal effects of the regression models.

Table 4
LEVEL 1 - Mobility. Main effects of values on 2019 behaviours, consistency and spillover.

Predictors	Mobility-Related Behaviours2019	
	Number of short flights	Mode of transportation for leisure
Biospherism	$F = 0.40, p = .529, \eta^2_p = .000$	$F = 1.08 p = .299, \eta^2_p = .001$
Number of short flights 2016	**$F = 26.46, p < .001, \eta^2_p = .013$**	$F = 0.47, p = .494, \eta^2_p = .000$
Mode of transportation for leisure 2016	**$F = 5.67, p = .017, \eta^2_p = .003$**	**$F = 19.62, p < .001, \eta^2_p = .010$**
Interac Bios*Flights_16	**$F = 17.31, p < .001, \eta^2_p = .008$**	$F = 0.79, p = .376, \eta^2_p = .000$
Interac Ego*Flights_16	$F = 3.27, p = .071, \eta^2_p = .002$	$F = 0.14, p = .712, \eta^2_p = .000$
Interac Hedo*Flights_16	$F = 2.70, p = .100, \eta^2_p = .001$	$F = 0.00, p = .981, \eta^2_p = .000$
Interac Bios*Transp mode_16	**$F = 13.74, p < .001, \eta^2_p = .007$**	**$F = 3.97, p = .046, \eta^2_p = .002$**
Interac Ego*Transp mode_16	$F = 0.309, p = .578, \eta^2_p = .000$	$F = 0.634, p = .426, \eta^2_p = .000$
Interac Hedo*Transp mode_16	$F = 0.01, p = .935, \eta^2_p = .000$	$F = 2.87, p = .090, \eta^2_p = .001$

Note: Blue cases represent temporal consistency effects (behaviour A 2016 to behaviour A 2019). Yellow cases represent spillover effects (from behaviour A 2016 to behaviour B 2019). In bold = significant at p < .05.

4.2.2.2. Heating – Temporal consistency moderated by environmental values. Biospherism interacted with bath 2016 to predict bath in 2019. Post-hoc analyses showed that high levels of biospherism had a significant positive moderating effect, $b = 0.70$, $t = 27.37$, $p < .001$, 95% CI [0.65; 0.76], as was the case also for low levels of biospherism which, however, gave way to a slightly weaker effect of X on Y, $b = 0.60$, $t = 24.98$, $p < .001$, 95% CI [0.55; 0.64], see Fig. 4 .

4.2.2.3. Heating – Spillover moderated by environmental values. Biospherism also interacted with room temperature in 2016 to predict bath in 2019. Post-hoc analyses highlighted a significant negative effect only for low levels of biospherism, $b = -0.07$, $t = -2.34$, $p = .019$, 95% CI [-0.12; -0.01], with a non-significant result observed for high levels of biospherism, $b = 0.02$, $p = .513$.

4.2.2.4. Heating – Summary. To sum up, as per the electricity behaviours observed in the previous section, we found temporal consistency on both heating behaviours. Bath frequency in 2016 predicted more strongly bath frequency in 2019 among respondents with high levels of biospherism. A negative effect was observed from room temperature in 2016 to bath 2019 for respondents with low levels of biospherism.

4.2.3. Mobility

We observed finally mobility behaviours, in particular transport choices for leisure activities and frequency of short flights. A General Linear Model multivariate analysis was run with leisure transport choices in 2019 and number of short flights as dependent variables, and their 2016 counterparts, biospherism and demographic variables as predictors (see results Table 4).

4.2.3.1. Mobility – Temporal consistency. Consistency was observed for both mobility behaviours, with leisure transport choices in 2016 predicting itself in 2019, and number of short flights in 2016 also predicting itself in 2019.

4.2.3.2. Mobility – Temporal consistency moderated by environmental values. The level of biospherism interacted with leisure transport choice to predict itself three years later. We ran a post-hoc analysis that highlighted a positive effect of leisure transport choice 2016 on 2019 at low levels of biospherism, $b = 2.92$, $t = 17.37$, $p < .001$, 95% CI [2.59; 3.25], while an even stronger effect emerged at high biospheric levels, $b = 3.47$, $t = 15.65$, $p < .001$, 95% CI [3.04; 3.91], meaning that consistency increases as biospheric values increase.

Biospherism also interacted with number of short flights to predict flights in 2019. Low levels of biospherism had a significant positive effect of short flights at time 1 on time 2, $b = 0.61$, $t = 26.51$, $p < .001$, 95% CI [0.57; 0.66], while high levels of biospherism had a significant yet weaker moderating effect, $b = 0.47$, $t = 16.96$, $p < .001$, 95% CI [0.42; 0.53], see Fig. 5.

4.2.3.3. Mobility – Spillover moderated by environmental values. Interestingly, biospherism interacted with leisure transport choice to predict number of flights three years later, illustrating a clean instance of transfer from one behaviour to another for consumers with high environmental values. In fact, post-hoc analysis revealed a negative effect of leisure transport choice 2016 on number flights 2019 at low levels of biospherism, $b = -0.16$, $t = -2.24$, $p = .025$, 95% CI [-0.29; -0.02], while high levels of biospherism had a significantly positive effect, $b = 0.24$, $t = 3.00$, $p = .003$, 95% CI [0.08; 0.39], see Fig. 5 (upper right panel).

4.2.3.4. Mobility - summary. Summarizing this section's results, consistent sustainable behaviours emerged over time for both mobility behaviours, similar to the results on electricity and heating. Consistency was stronger for leisure transport choice among participants with high levels of biospherism (similarly to results observed for bath frequency), however the reverse was emerged for flight frequency, where consistency was stronger among participants with low levels of biospherism. In contrast to the results on the other two domains, spillover was observed according to level of biospherism: high levels of biospheric values led to positive spillover from leisure transport choices to number of short flights three years later, while low levels of biospheric values led to the target behaviour having a negative effect on different behaviours.

4.2.4. Discussion of level 1 results

The results of Level 1, where we examined single sustainable behaviours either predicting the same behaviour or a different behaviour three years later, highlighted that sustainable consumption remains highly consistent over time. This appears entirely consistent with what is known about consumer habits (Ji & Wood, 2007; Krumme et al., 2013) and about habits in general (Wood & Rünger, 2016), and confirms H1.

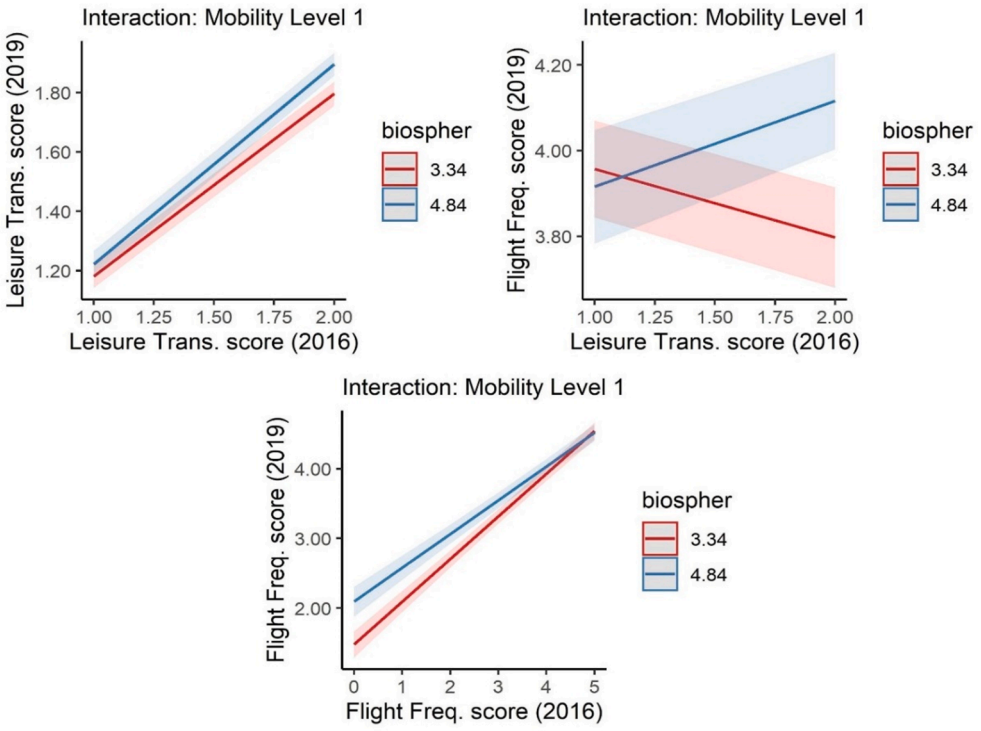

Fig. 5. Interaction effects between mobility choices in 2016 and biospheric values predicting future mobility choices occurring in 2019. The graph represents data adjusted for age, income, sex, household size, residency type, competing values and competing behaviours at the same level. The psychological values are illustrated at cut-off points set at 1 Standard Deviation above (blue) and below (red) the mean. Coloured shaded areas represent the marginal effects of the regression models.

On the other hand, biospherism only partially strengthened sustainable behaviours over time, giving rise also to a series of mixed results. It is highly likely that a consumer's biospheric values have more chance of influencing sustainable behaviours that offer a certain degree of leeway. In fact, biospheric values influenced temporal consistency only for behaviours that offered some freedom of choice, such as number of baths, number of flights and leisure transport choices. Behaviours instead where biospherism was not predictive of consistency tended to offer less freedom, such as setting room temperature, which in some apartments and houses may be controlled by a central thermostat, and not by room. For that reason, H2 is only partially confirmed. Lastly, limited evidence of spillover emerged in the current findings, with biospherism predicting only two distinct cases of spillover, focused on the transfer from one electricity behaviour to another, and the transfer from one mobility behaviour to another. This is interesting in the latter case because mobility forms of consumption have been identified as among the most environmentally impactful (Wynes & Nicholas, 2017) and, these types of behaviour likely offer more room for individual decision-making than other forms of consumption. Given that biospherism predicted only two instances of positive spillover, albeit of environmental importance, we cannot confirm H3. Next, we turn to see if these results are supported when using behavioural aggregates.

4.3. Across behaviour-aggregates: Level 2

The last stage of the analysis focused on consistency within and spillover between the three behaviour-aggregates discussed so far (heating, mobility, electricity). We first wanted to determine whether a person's behaviour across one behaviour-aggregate could predict levels of behaviour three years later, within that same behaviour-aggregate (i.e. consistency). We ran a General Linear Model multivariate analysis with the three behaviour-aggregate variables (electricity, heating and mobility) in 2019 as dependent variables, and the three behaviour-aggregate variables for 2016 as predictors, along with the

Table 5
LEVEL 2. Main effects of values on 2019 Behaviour Aggregates, consistency and spillover.

	2019 Behaviour Aggregates		
Predictors	Heat	Mobility	Electricity
Biospherism	$\boldsymbol{F = 5.05, p = .025, \eta^2_p = .003}$	$F = 0.70, p = .407, \eta^2_p = .000$	$\boldsymbol{F = 8.54, p = .004, \eta^2_p = .005}$
Heating 2016	$\boldsymbol{F = 5.48, p = .019, \eta^2_p = .003}$	$F = 0.05, p = .821, \eta^2_p = .000$	$F = 0.22, p = .640, \eta^2_p = .000$
Mobility 2016	$F = 0.19, p = .663, \eta^2_p = .000$	$\boldsymbol{F = 20.37, p < .001, \eta^2_p = .011}$	$F = 0.01, p = .929, \eta^2_p = .000$
Electricity 2016	$F = 0.62, p = .432, \eta^2_p = .000$	$F = 0.69, p = .407, \eta^2_p = .000$	$\boldsymbol{F = 26.77, p < .001, \eta^2_p = .014}$
Interac Bios*Heat_16	$\boldsymbol{F = 9.87, p = .002, \eta^2_p = .005}$	$F = 0.01, p = .925, \eta^2_p = .000$	$F = 1.49, p = .222, \eta^2_p = .001$
Interac Ego*Heat_16	$F = 0.80, p = .373, \eta^2_p = .000$	$F = 0.10, p = .752, \eta^2_p = .000$	$F = 0.09, p = .760, \eta^2_p = .000$
Interac Hedo*Heat_16	$F = 0.17, p = .677, \eta^2_p = .000$	$F = 0.27, p = .603, \eta^2_p = .000$	$F = 0.09, p = .760, \eta^2_p = .000$
Interac Bios*Mob_16	$F = 0.03, p = .853, \eta^2_p = .000$	$\boldsymbol{F = 5.09, p = .024, \eta^2_p = .003}$	$F = 3.14, p = .077, \eta^2_p = .002$
Interac Ego*Mob_16	$F = 0.16, p = .691, \eta^2_p = .000$	$F = 0.44, p = .506, \eta^2_p = .000$	$F = 0.37, p = .562, \eta^2_p = .000$
Interac Hedo*Mob_16	$F = 0.00, p = .968, \eta^2_p = .000$	$F = 1.01, p = .316, \eta^2_p = .001$	$F = 1.60, p = .207, \eta^2_p = .001$
Interac Bios*Elec_16	$F = 0.55, p = .459, \eta^2_p = .000$	$F = 1.01, p = .316, \eta^2_p = .001$	$\boldsymbol{F = 6.29, p = .012, \eta^2_p = .003}$
Interac Ego*Elec_16	$F = 0.01, p = .926, \eta^2_p = .000$	$F = 0.28, p = .600, \eta^2_p = .000$	$F = 0.69, p = .406, \eta^2_p = .000$
Interac Hedo*Elec_16	$F = 0.28, p = .600, \eta^2_p = .000$	$F = 0.04, p = .838, \eta^2_p = .000$	$F = 0.17, p = .680, \eta^2_p = .000$

Note: Blue cases represent temporal consistency effects (behaviour-aggregate A 2016 to behaviour-aggregate A 2019). Yellow cases represent spillover effects (from behaviour-aggregate A 2016 to behaviour-aggregate B 2019). In bold = significant at $p < .05$.

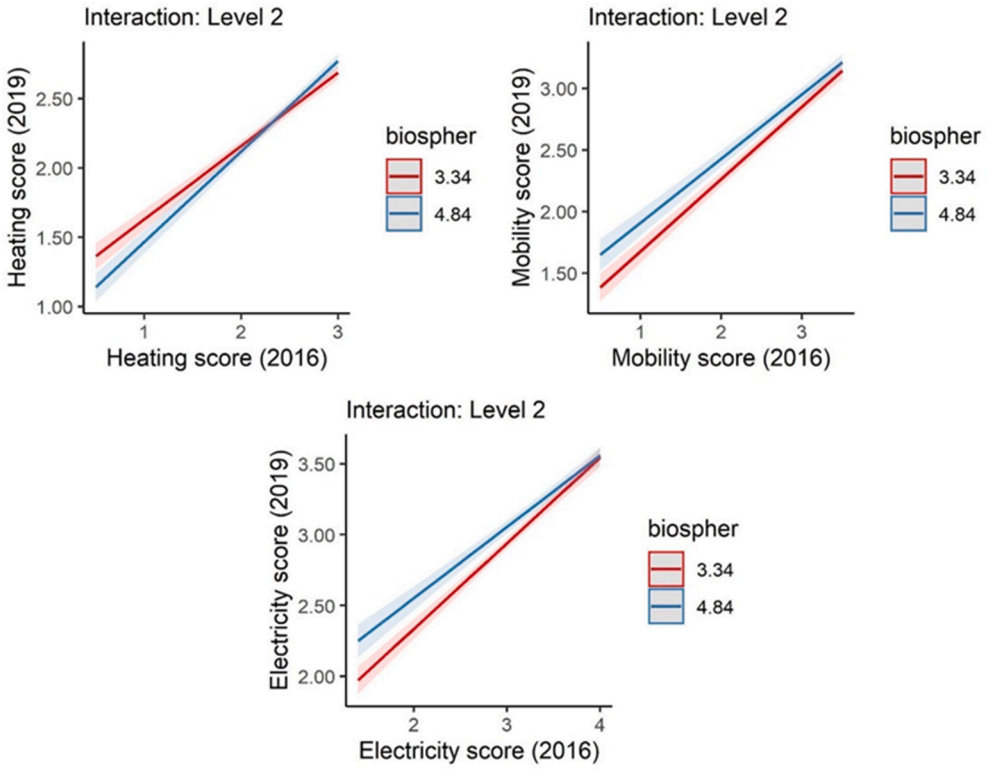

Fig. 6. Interaction effects between electricity, heating and mobility-related behaviours in 2016 and psychological values predicting future behaviours in other broad classes of behaviours. The graphs represents data adjusted for age, income, sex, household size, residency type, competing values and competing behaviours at the same level. Biospheric values are illustrated at cut-off points set at 1 Standard Deviation above (blue) and below (red) the mean. Coloured shaded areas represent the marginal effects of the regression models.

biospherism, and the set of demographic control variables (see results in Table 5).

4.3.1. Level 2 – Temporal consistency

The analysis highlighted consistency from 2016 to 2019 for all three behaviour-aggregates, with electricity-related behaviour in 2016 significantly predicting electricity-related behaviour in 2019, heating-related behaviour in 2016 significantly predicting heating-related behaviour in 2019, and mobility-related behaviour significantly predicting future heating-related behaviour in 2019. Each behaviour-aggregate therefore predicted itself three years later, thus replicating the pattern of results observed for Level 1.

4.3.1.1. Level 2 – Temporal consistency moderated by values. Biospherism interacted with each behaviour-aggregate to predict consistent behaviour in the future. In the case of heating, high levels of biospherism had a significant positive moderating effect, $b = 0.67$, $t = 23.93$, $p < .001$, 95% CI [0.61; 0.72], while lower levels of biospherism had a weaker yet still significant positive effect, $b = 0.54$, $t = 23.62$, $p < .001$, 95% CI [0.49; 0.58], therefore highlighting greater temporal consistency at high levels of biospherism. Regarding mobility, a positive moderating effect emerged at low levels of biospherism, $b = 0.58$, $t = 25.25$, $p < .001$, 95% CI [0.53; 0.62], while a significant yet weaker effect emerged at high levels of the value, $b = 0.51$, $t = 17.58$, $p < .001$, 95% CI [0.45; 0.57]. Lastly the post-hoc analyses for electricity highlighted a significant positive moderating effect at low levels of biospherism, $b = 0.59$, $t = 23.23$, $p < .001$, 95% CI [0.54; 0.64], which was also significant and positive at high levels of the value, $b = 0.49$, $t = 14.76$, $p < .001$, 95% CI [0.43; 0.56], though less statistically strong. The interaction effects are illustrated in Fig. 6.

4.3.1.2. Level 2 – Spillover moderated by environmental values. We then tested whether biospheric values interacted with behaviour-aggregate scores in 2016 to help unravel spillover effects, but no significant spillover emerged.

4.3.2. Discussion of level 2 results

The results of Level 2, investigating temporal consistency and spillover by focusing on the behavioural aggregates, confirmed once again that sustainable consumption remains highly consistent across several years. While the electricity, heating or mobility aggregated behaviours were entirely predictive of themselves in the future, confirming H1, the addition of biospherism as a moderating factor proved to be of reduced statistical utility, finding once again, only partial support for H2. In fact, biospherism played a marginal, and mixed role in moderating the main effects, and was not predictive of any form of positive spillover, providing no support for H3.

5. General discussion

Our longitudinal survey on more than two thousand consumers shows that, within a three-year time-frame, sustainable consumption remains highly consistent over time. Sustainable consumption is commonly regarded as a broad concept encompassing a number of distinct behaviours and choices within it. Here we find that high levels of consistency from 2016 to 2019 are maintained within each of the individual behaviour types examined, and within each of the broader heating, mobility and electricity aggregate-scores.

Psychological values have often been hailed as strong drivers of sustainable behaviour, and we observed a number of instances where biospherism did interact with past behaviour to drive spillover, i.e. transfer from one sustainable behaviour to another different one several years later. This was the case for mobility-related behaviours, where green transport choices (e.g. taking the bike or walking) for local leisure activities predicted reduced number of short flights among consumers with high levels of biospherism. At times, instead, biospherism predicted future sustainable behaviour regardless of past behaviour, as in the case to switching off appliances not in use, which highly biospheric consumers appear to do regardless of the types of bulbs they purchased in the past. Interestingly, this highlights that certain behaviours may be largely decorrelated for highly biospheric consumers, perhaps because the behaviours were driven by different motives, e.g. environmental Vs

saving money.

5.1. Main effects of temporal consistency

All behaviours examined in 2016 were solid predictors of the same behaviour three years later, confirming our H1 for each individual behaviour and for each of the three heating, mobility and electricity behaviour aggregates. Our results are entirely congruent with preceding streams of research, extending in particular the findings of Ouellette and Wood (1998) to show unadulterated consistency over a three-year period, across several different behaviours that are fundamental to ecological conservation. In particular the current findings are in line with two previous studies both investigating longitudinal effects: the first highlighted consistency of water conservation efforts (Moore et al., 1994) while the second demonstrated consistency across a number of individual sustainable behaviours (Thøgersen & Ölander, 2003). Therefore, building upon these previous studies we show that the choices consumers make within each individual behaviour type and when aggregating similar behaviour types (e.g. electricity-related behaviours) can predict the same choices in the future.

5.2. Temporal consistency moderated by values

We do not find ample evidence that environmental values (i.e. biospherism) lead to more consistent sustainable behaviour over time. In fact, the current findings only found partial confirmation of H2. This is an interesting finding given that biospherism has previously emerged as a strong predictor of individual behaviour (e.g. Abrahamse & Steg, 2011; de Groot & Steg, 2008; de Groot & Thøgersen, 2012; Schultz & Zelezny, 1998) even predicting sustainable consumption over time, with regards to electricity consumption (Henn et al., 2019; Puntiroli & Bezençon, 2020). In the present study, biospherism tended to moderate the degree of consistency only of certain behaviours where increased decision-making freedom could be experienced. Ji and Wood (2007) explain that for many daily consumption activities individuals tend to be in a form of "auto-pilot", behaving with very little intent or control, and it is likely that these behaviours offer the least possibility of moderation from psychological values. In the next section we delve deeper into this line of thought.

5.3. Spillover moderated by values

By examining the moderating effect of biospheric values, several spillover effects emerged but, again, they remained infrequent and fragmented. Our H3 was therefore not confirmed by the present findings. Thus, 17 years after the original study and in an increasingly favourable context where environmental issues have become much more salient, and sustainable behaviours advocated, spillover remains limited. Strong habits tend to be stronger than psychological drivers, such as a person's intention to change behaviour (see Neal et al., 2006), with evidence also showing that nudge interventions can be ineffective at changing strong food consumption habits (Venema et al., 2020). Here we find further evidence of this, where habits appear effective at keeping consumers' choices consistent over the years, and preventing them from easily developing new forms of sustainable consumption even when they have a strong psychological drive to do so (i.e. high biospherism).

As mentioned regarding consistency, a possible explanation is that spillover is most likely to occur when the individual knows, or thinks they know, the reason why they performed the past behaviour (Cornelissen et al., 2007). All behaviours we examined, except for frequency of short flights and bulb purchasing, were relatively routine behaviours and may not have been imbued with excessive volition. This point regarding the level of volition involved in the behaviours becomes especially important when considering values. While the link between values and sustainable consumption has been well established, particularly regarding the beneficial effects of biospherism (de Groot & Steg, 2009; Sloot et al., 2018; van der Werff et al., 2013), values are believed to be particularly good predictors of behaviours driven by intent (Parks & Guay, 2009). Interestingly, the most environmental consumers in our study exhibited spillover from leisure transport choices onto frequency of short flights, where each decision to take a flight, or not, is arguably more deliberate than many other behaviours tested in the current project. Also, the fact that we see that leisure transport choices spill over onto frequency of short flights, may be explained by the fact that spillover is most likely to occur between behaviours that are conceptually similar (Thøgersen, 2004). These two behaviours may share greater similarities than other behaviours we examined, such as room temperature and frequency of baths, comprising the heating aggregate score.

The spillover effect that emerged between different mobility choices should be given adequate attention. The reason for this is that it has become clear that mobility behaviours have a higher impact on the environment than most other behaviours (Wynes & Nicholas, 2017) and the most environmental consumers will likely be aware of this and, therefore, motivated to address mobility behaviours. These explanations in conjunction may explain why the cleanest instance of spillover we observed occurred for mobility-related behaviour. Furthermore, this effect is partly supported by qualitative evidence showing that the most environmental consumers who successfully saved energy in their household often tried to drive or fly less (Hargreaves et al., 2010). The fact that we see very few clear spillover effects from behaviour type to another leads us to consider the difficulties in observing the transfer of one sustainable behaviour to another.

5.3.1. Spillover only emerging under certain conditions

Investigating relatively stable drivers of behaviours, such as psychological values, in the context of spillover appeared a worthy endeavour. However, it may be necessary to consider alternative psychological variables in order to observe spillover effects. Several accounts of spillover have emerged by focusing on attitudes and change of attitudes to observe the effect of one behaviour on another (Henn et al., 2020), or by using environmental beliefs as a means to segment the population sample (Paillé et al., 2019). Perhaps values are effective at predicting single sustainable behaviours, but weak predictors of transfer from one behaviour to a different behaviour, where a leaner, more flexible psychological construct (e.g. attitudes) may be more predictive.

It may be difficult to observe a clear influence of one behaviour on another due to the multitude of competing psychological mechanisms that render the picture highly complex, as discussed by Nilsson et al. (2017). These competing effects directly limit the possibility that performing one sustainable behaviour will drive an individual to perform other such behaviours. Santarius and Soland (2018) explain that depending on the situation, the interplay between rebound effects and an individual's desire to be ecologically consistent, can lead to increased or decreased sustainable behaviour. These effects likely contribute to making the spillover research murkier.

5.3.2. Sustainable consumption is a multifaceted concept

It is worth considering that "sustainable consumption", just as "conservation behaviour" or "pro-environmental behaviour", may be a useful linguistic construction that, however, comprises many behaviours motivated by many different goals, often entirely distinct one from the other. Support for this viewpoint comes from the numerous studies that failed to observe spillover from one sustainable behaviour to another (Corraliza & Berenguer, 2000; Karp, 1996; Oreg & Katz-Gerro, 2006; Thøgersen & Ölander, 2003). A straightforward example of sustainable behaviour being primarily driven by entirely distinct motives is mending old furniture to avoid unnecessary consumption of earth's resources, or for pure economic savings. Many examples exist of consumers making sustainable choices, for reasons that have very little to do with the environment (Gatersleben et al., 2002; Lavelle et al., 2015). The fact that people may have multiple goals that drive sustainable behaviours, where each goal is tied to an identity (e.g. environmentalist vs driver vs

holiday-maker) was also proposed by Whitmarsh and O'Neill (2010) who found that people who act sustainably in one context do not necessarily act sustainably in another. This view that there might be a multitude of competing goals present within each individual at a given time, appears to be in direct opposition to the view that sustainable consumption could be considered a unified concept (e.g. Kaiser & Wilson, 2004), comprising many behaviours all driven by a single overarching goal: that of conservation.

The view that actions are driven by an overarching goal or value, i.e. one direction, has been challenged by a proposed model where actions are often responsible for shaping goals and values, i.e. two-directional (Vinckier et al., 2019). This model does not seem compatible with a single sustainable goal exerting causal influence on consumer behaviour. Lastly, the difficulty in transferring sustainable consumption from one setting to another that emerged in the current findings was also highlighted by other researchers finding difficultly of transfer of sustainable behaviours from home to holiday settings (Barr et al., 2010) or from home to one's place of work (Paillé et al., 2019; Saphores et al., 2012). These findings suggest sustainable consumption may be, at least in part, context specific. It appears difficult to consider sustainable consumption as a tightly knit unified concept, which in turn likely makes spillover effects difficult to observe.

To sum up, the existence of competing mechanisms, and the fact that sustainable consumption is likely not a unified concept (i.e. not all behaviours motivated by one goal) can help explain the lack of spillover we observed in our data.

5.4. Implications for businesses, policymakers, and non-profits

The individual choices consumers make have a large environmental impact, such as food choices (Hartmann & Siegrist, 2017) or choices of energy-efficient appliances (Volland, 2017). Therefore, understanding the relationships between the same consumption choices over time and across consumption choices is important to inform policy makers and non-profits about the best strategies to encourage sustainable consumption. It also provides insights to businesses on how to deal with sustainable consumption, whether they are providers of sustainable offers or not. We detail implications for businesses, policy makers and non-profit managers below.

For businesses and marketing managers in particular, knowing how sustainable one's customers' or employees' behaviours are in the present, should provide a fairly accurate prediction of whether they will be engaging in that same behaviour several years later. The results also suggest that highly biospheric consumers do not necessarily purchase sustainable offers across the board and will not necessarily do so in the future. In fact, we find only weak evidence of sustainable behaviour predicting different sustainable behaviours in the future. Businesses looking to predict future sustainable behaviours of consumers in order to offer those products and services that best meet their needs, should rely heavily on the data they have on current sustainable behaviours, in order to make predictions several years into the future. The consumer behaviour data of this study strongly suggests consumers are creatures of habit, as previously emerged for shopping patterns (Krumme et al., 2013), with sustainable behaviours that do not deviate significantly over the years. Relatedly, as individuals are consistent over time in terms of sustainable behaviours, investing in behaviour change programs to improve customer acquisition or cross-selling for sustainable products could prove difficult, but fruitful, in the long-term. That is, it may be difficult to convert individuals, but once they are converted, it may not require much effort to help them maintain the new behaviour over time. In fact, behavioural consistency is akin to the concept of consumer loyalty applied to sustainable offers.

For policy makers and non-profit managers, a similar argument can be made for the encouragement of sustainable behaviours (e.g. recycling, using more sustainable mobility options, etc.). Converting people may be difficult, but once converted, it may be easier to maintain the behaviour. Also, instances of spillover occur for people higher in biospheric values. This hints that behaviour change will be greatly facilitated if the culture of sustainability continues to improve. Spillover from one sustainable behaviour to the others will be facilitated if policy makers, non-profits and even marketing managers engage in the difficult and long-term task of creating a fertile ground for value change, from less to more biospheric values.

5.5. Limitations

Several limitations to the project should be considered. Firstly, the behaviours examined were self-reports, which can be biased (e.g. consistency, social desirability). Because of the large time lapse between the two measurements, it is fair to assume that participants did not remember their first answer when they completed the following questionnaire, thus avoiding the consistency issue. Social desirability, if present, would bias the means, but not the predictions across waves, as both waves could be biased in the same way.

A second limitation revolves around the impossibility of knowing when the behaviour started, meaning we look solely at the predictive power of one behaviour on another. It is possible that if one is not engaged in a behaviour at all, meaning they were not doing the behaviour in 2016, then it might be possible to observe more instances of spillover. A further limitation regards the bath usage, where we cannot be sure that the people who reported never taking a bath did have the possibility to actually take a bath, as we did not measure if their home was equipped with a bath structure. Another limitation of the study is that the grouping of behaviours into aggregates of similar behaviours could be considered arbitrary. We choose a grouping based on technical domains like electricity, heating and mobility, but other possibilities could have been used instead, and are avenues for futures studies. It is in fact possible that patterns of spillover are different depending on the type of grouping. Notably, the level of automaticity of the behaviour could be another grouping (i.e. higher or lower volition), with on one hand behaviours with a strong habit dimension, and on the other hand behaviours that are less frequent and more deliberate. Costs of the behaviour could also have been considered as a grouping, with low-costs behaviours on one side and more costly behaviours on the other side. Larson et al. (2015) proposed a structure of four groupings: conservation lifestyle behaviours, social environmentalism, environmental citizenship, and land stewardship. Another type of categorization used in the literature is frequency of the behaviours (Truelove & Gillis, 2018). These authors demonstrated that laypeople's perception of sustainable behaviour is different from expert's one, adding a layer of complexity about which grouping should be used. In our view, laypeople's grouping makes more sense for studying spillover, as it appears to be immediately understandable, as well as widely used in business and by utility companies.

5.6. Conclusion

To conclude, the sustainable behaviours consumers engage in remain highly stable in the current social context, where present behaviours predict with high amount of accuracy the sustainable behaviours that consumers carry out several years later. We therefore note that sustainable behaviours are extremely hard to change: we, as consumers, are highly consistent overtime and there is limited spillover from one behaviour to another. Investigating sustainable consumption more holistically is becoming more and more necessary (e.g. Henn et al., 2020), moving beyond the study of individual behaviours. However, it is worth remaining open to the fact that sustainable consumption may be a multifaceted concept, encompassing many behaviours driven by many different goals. Even with a limited amount of spillover emerging, the fact that a few instances of spillover did emerge when consumers had high environmental values offers reason for cautious optimism, in that instilling desirable environmental values has the potential to lead to

some spontaneous transfer from one sustainable behaviour to another. Furthermore, the remarkable levels of consistency that emerged for all sustainable behaviours we examined, and their aggregates, emphasizes that sustainable consumption may be largely driven by habits. This emphasizes the ease at which consumers maintain sustainable habits, while also emphasizing the challenge involved in breaking down the negative ones.

CRediT authorship contribution statement

Michael Puntiroli: Conceptualization, Data curation, Writing – original draft, Writing – review and editing, Visualization, Investigation, Validation, Formal analysis, Methodology, Resources, Project administration and Software. **Lisa S. Moussaoui:** Conceptualization, Data curation, Writing – original draft, Writing – review and editing, Validation, Formal analysis, Methodology, Resources. **Valéry Bezençon:** Conceptualization, Funding acquisition, Writing – review and editing, Supervision.

Funding

The research is part of the activities of SCCER CREST, which is financially supported by the Swiss Commission for Technology and Innovation (CTI) (Grant N° KTI 1155000154).

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix

Table A1
Original Scales and Measurements Used.

Variable	Individual Items	Measurement
Age	–	Free Entry of Numerals
Sex	–	0 = Male; 1 = Female
Household gross income per month	1. Less than 3′000 2. 3′000-4′5000 3. 4′501-6′000 4. 6′001-9′000 5. 9′001-12′000 6. More than 12′000	Respondents select one option(“no answer/does not know” could be indicated, coded as −1)
Household size		Free Entry of Numerals
Resident Type	–	1 = Tenant; 2 = Owner
What type of bulbs do you usually use in your residence? *	1. Conventional 2. Energy-Saving 3. LED	None = 1; Some = 2; Only = 3
Do you switch off (no standby position) the following electronic devices when you do not usethem? *	1. TV 2. Coffee Machine 3. Desktop computer 4. Internet modem	Almost never = 1; Occasionally = 2; Often = 3
On average, how many baths are taken per week in your household?Please add up usages for all persons in the household. *	–	Free Entry of Numerals
Do you heat all rooms at the same temperature?	–	No = 0; Yes = 1
What mode of transportation do you mainly use for leisure activities? *	1. Private Car 2. Car Sharing 3. Public Transportation 4. Soft Mobility (bike, foot)	Respondent free to select all applicable options
Over the last 12 months, how many times did you travel by plane for personal reasons?A round trip = 1 and includes stopovers.	1. Short or middle distance	0, 1, 2, 3, 4, 5 or more.
Biospherism: Please rate how important each value is for you as a guiding principle in your life.	1. RESPECTING THE EARTH: harmony with other species 2. UNITY WITH NATURE: fitting into nature 3. PROTECTING THE 4. ENVIRONMENT: preserving nature 5. PREVENTING POLLUTION: protecting natural resources	Not important at all = 1 to Extremely Important = 7
Hedonism: Please rate how important each value is for you as a guiding principle in your life.	1. PLEASURE: joy, gratification of desires 2. ENJOYING LIFE: enjoying food, sex, leisure, etc. 3. SELF-INDULGENT: doing pleasant things	Not important at all = 1 to Extremely Important = 7
Egoism: Please rate how important each value is for you as a guiding principle in your life.	1. SOCIAL POWER: control over others, dominance 2. WEALTH: material possessions, money 3. AUTHORITY: the right to lead or command 4. INFLUENTIAL: having an impact on people and events 5. AMBITIOUS: hard-working, aspiring	Not important at all = 1 to Extremely Important = 7

Note 1: All measurements taken at both time stamps (2016 and 2019).
Note 2: All variables with an asterix were recoded or winsorized, as detailed in the method section.

References

Abrahamse, W., & Steg, L. (2011). Factors Related to Household Energy Use and Intention to Reduce It: The Role of Psychological and Socio-Demographic Variables. *Human Ecology Review, 18*(1), 30–40. https://doi.org/10.2307/24707684

Ajzen, I. (1991). The theory of planned behaviour. *Organizational Behavior and Human Decision Processes, 50*, 179–211. https://doi.org/10.1922/CDH_2120VandenBroucke08

Andi, S. (2020). How People Access News about Climate Change. *Digital News Report.* https://www.digitalnewsreport.org/survey/2020/how-people-access-news-about-climate-change/.

Aoyagi-Usui, M., Vinken, H., & Kuribayashi, A. (2003). Pro-environmental attitudes and behaviors: An international comparison. *Research in Human Ecology, 10*(1), 23–31.

Barr, S., Shaw, G., Coles, T., & Prillwitz, J. (2010). “A holiday is a holiday”: Practicing sustainability, home and away. *Journal of Transport Geography, 18*(3), 474–481. https://doi.org/10.1016/j.jtrangeo.2009.08.007

Bezençon, V., & Etemad-Sajadi, R. (2015). The effect of a sustainable label portfolio on consumer perception of ethicality and retail patronage. *International Journal of Retail & Distribution Management, 43*(4/5), 314–328. https://doi.org/10.1108/IJRDM-03-2014-0035

Brügger, A., & Höchli, B. (2019). The Role of Attitude Strength in Behavioral Spillover: Attitude Matters—But Not Necessarily as a Moderator. *Frontiers in Psychology, 10*, 1018. https://doi.org/10.3389/fpsyg.2019.01018

Burger, P., Bezençon, V., Bornemann, B., Brosch, T., Carabias-Hütter, V., Farsi, M., … Volland, B. (2015). Advances in Understanding Energy Consumption Behavior and the Governance of Its Change—Outline of an Integrated Framework. *Frontiers in Energy Research, 3*. https://doi.org/10.3389/fenrg.2015.00029

Chan, H. W. (2020). When do values promote pro-environmental behaviors? Multilevel evidence on the self-expression hypothesis. *Journal of Environmental Psychology*, *71* (September 2019), 101361. doi: 10.1016/j.jenvp.2019.101361.

Cialdini, R. B. (2003). Crafting Normative Messages to Protect the Environment Social Psychology Crafting Normative Messages to Protect. *Current Directions in Psychological Science, 12*(4), 105–109. https://doi.org/10.1111/1467-8721.01242
Coolican, H. (2004). *Research methods and statistics in psychology* ((4th ed.).). Bookpoint.
Cooper, R. P., Ruh, N., & Mareschal, D. (2014). The goal circuit model: A hierarchical multi-route model of the acquisition and control of routine sequential action in humans. *Cognitive Science, 38*(2), 244–274. https://doi.org/10.1111/cogs.12067
Cornelissen, G., Dewitte, S., Warlop, L., & Yzerbyt, V. (2007). Whatever people say I am, that's what I am: Social labeling as a social marketing tool. *International Journal of Research in Marketing, 24*(4), 278–288. https://doi.org/10.1016/j.ijresmar.2007.05.001
Corraliza, J. A., & Berenguer, J. (2000). Environment and Behavior. *Environment and Behavior, 32*(6), 832–848. https://doi.org/10.1177/00139160021972829
de Groot, J. I. M., & Steg, L. (2007). Value Orientations and Environmental Beliefs in Five Countries: Validity of an Instrument to Measure Egoistic, Altruistic and Biospheric Value Orientations. *Journal of Cross-Cultural Psychology, 38*(3), 318–332. https://doi.org/10.1177/0022022107300278
de Groot, J. I. M., & Steg, L. (2008). Value Orientations to Explain Beliefs Related to Environmental Significant Behavior: How to Measure Egoistic, Altruistic, and Biospheric Value Orientations. *Environment and Behavior, 40*(3), 330–354. https://doi.org/10.1177/0013916506297831
de Groot, J. I. M., & Steg, L. (2009). Mean or green: Which values can promote stable pro-environmental behavior? *Conservation Letters, 2*(2), 61–66. https://doi.org/10.1111/j.1755-263X.2009.00048.x
de Groot, J. I. M., & Thøgersen, J. (2012). *Values and Pro-Environmental Behaviour*. John Wiley & Sons.
Doran, C. J. (2009). The Role of Personal Values in Fair Trade Consumption. *Journal of Business Ethics, 84*(4), 549–563. https://doi.org/10.1007/s10551-008-9724-1
Duchi, L., Lombardi, D., Paas, F., & Loyens, M. M. (2020). How a growth mindset can change the climate: The power of implicit beliefs in influencing people' s view and action. *Journal of Environmental Psychology*, *70*(December 2019). doi: 10.1016/j.jenvp.2020.101461.
Fishbein, M., & Ajzen, I. (1974). Attitudes towards objects as predictors of single and multiple behavioral criteria. *Psychological Review, 81*(1), 59–74. https://doi.org/10.1037/h0035872
Gatersleben, B., Steg, L., & Vlek, C. (2002). Measurements and determinats of environmentally significant consumer behavior. *Environment and Behavior, 34*(3), 335–362.
Hargreaves, T., Nye, M., & Burgess, J. (2010). Making energy visible: A qualitative field study of how householders interact with feedback from smart energy monitors. *Energy Policy, 38*(10), 6111–6119. https://doi.org/10.1016/j.enpol.2010.05.068
Hartmann, C., & Siegrist, M. (2017). Consumer perception and behaviour regarding sustainable protein consumption: A systematic review. *Trends in Food Science & Technology, 61*, 11–25. https://doi.org/10.1016/j.tifs.2016.12.006
Henn, L., Otto, S., & Kaiser, F. G. (2020). Positive spillover: The result of attitude change. *Journal of Environmental Psychology*, *69*(September 2019). doi: 10.1016/j.jenvp.2020.101429.
Henn, L., Taube, O., & Kaiser, F. G. (2019). The role of environmental attitude in the efficacy of smart-meter-based feedback interventions. *Journal of Environmental Psychology, 63*(January), 74–81. https://doi.org/10.1016/j.jenvp.2019.04.007
Höchli, B., Brügger, A., Abegglen, R., & Messner, C. (2019). Using a Goal Theoretical Perspective to Reduce Negative and Promote Positive Spillover After a Bike-to-Work Campaign. *Frontiers in Psychology, 10*, 433. https://doi.org/10.3389/fpsyg.2019.00433
Ji, M., & Wood, W. (2007). Habitual Purchase and Consumption: Not Always What You Intend. *Journal of Consumer Psychology, 17*(17), 261–276.
Kaiser, F. G., & Wilson, M. (2004). Goal-directed conservation behavior: The specific composition of a general performance. *Personality and Individual Differences, 36*(7), 1531–1544. https://doi.org/10.1016/j.paid.2003.06.003
Karp, D. G. (1996). Values and their effect on pro-environmental behavior. *Environment and Behavior, 28*(1), 111–133. https://doi.org/10.1177/0013916596281006
Krumme, C., Llorente, A., Cebrian, M., Pentland, A., & Moro, E. (2013). The predictability of consumer visitation patterns. *Scientific Reports, 3*, 1–5. https://doi.org/10.1038/srep01645
Larson, L. R., Stedman, R. C., Cooper, C. B., & Decker, D. J. (2015). Understanding the multi-dimensional structure of pro-environmental behavior. *Journal of Environmental Psychology, 43*, 112–124. https://doi.org/10.1016/j.jenvp.2015.06.004
Lavelle, M. J., Rau, H., & Fahy, F. (2015). Different shades of green? Unpacking habitual and occasional pro-environmental behavior. *Global Environmental Change, 35*, 368–378. https://doi.org/10.1016/j.gloenvcha.2015.09.021
Maki, A., Carrico, A. R., Raimi, K. T., Truelove, H. B., Araujo, B., & Yeung, K. L. (2019). Meta-analysis of pro-environmental behaviour spillover. *Nature Sustainability, 2*(4), 307–315. https://doi.org/10.1038/s41893-019-0263-9
Moore, S., Murphy, M., & Watson, R. (1994). A longitudinal study of domestic water conservation behavior. *Population and Environment, 16*(2), 175–189. https://doi.org/10.1007/BF02208782
Neal, D. T., Wood, W., & Quinn, J. M. (2006). Habits—A repeat performance. *Current Directions in Psychological Science, 15*(4), 198–202. https://doi.org/10.1111/j.1467-8721.2006.00435
Nilsson, A., Bergquist, M., & Schultz, W. P. (2017). Spillover effects in environmental behaviors, across time and context: A review and research agenda. *Environmental Education Research, 23*(4), 573–589. https://doi.org/10.1080/13504622.2016.1250148
Nordlund, A. M., & Garvill, J. (2002). Value structures behind proenvironmental behavior. *Environment and Behavior, 34*(6), 740–756. https://doi.org/10.1177/001391602237244
Olsen, J., Thach, L., & Hemphill, L. (2012). The impact of environmental protection and hedonistic values on organic wine purchases in the US. *International Journal of Wine Business Research, 24*(1), 47–67. https://doi.org/10.1108/17511061211213783
Oreg, S., & Katz-Gerro, T. (2006). Predicting proenvironmental behavior cross-nationally: Values, the theory of planned behavior, and value-belief-norm theory. *Environment and Behavior, 38*(4), 462–483. https://doi.org/10.1177/0013916505286012
Ouellette, J. A., & Wood, W. (1998). Habit and Intention in Everyday Life: The Multiple Processes by Which Past Behavior Predicts Future Behavior. *Psychological Bulletin, 124*(1), 54–74. https://doi.org/10.1037/0033-2909.124.1.54
Paillé, P., Raineri, N., & Boiral, O. (2019). Environmental Behavior On and Off the Job: A Configurational Approach. *Journal of Business Ethics, 158*(1), 253–268. https://doi.org/10.1007/s10551-017-3758-1
Panu, P. (2020). Anxiety and the Ecological Crisis: An Analysis of Eco-Anxiety and Climate Anxiety. *Sustainability, 12*(19), 7836. https://doi.org/10.3390/su12197836
Parks, L., & Guay, R. P. (2009). Personality, values, and motivation. *Personality and Individual Differences, 47*(7), 675–684. https://doi.org/10.1016/j.paid.2009.06.002
Puntiroli, M., & Bezençon, V. (2020). Feedback devices help only environmentally concerned people act pro-environmentally over time. *Journal of Environmental Psychology, 70*, Article 101459. https://doi.org/10.1016/j.jenvp.2020.101459
R Core team. (2018). *R: A Language and envionment for statistical computing. [Computer software]*. https://cran.r-project.org/.
Revkin, A. (2019). Most Americans now worry about climate change—And want to fix it. *National Geographic*. https://www.nationalgeographic.com/environment/article/climate-change-awareness-polls-show-rising-concern-for-global-warming.
Santarius, T., & Soland, M. (2018). How Technological Efficiency Improvements Change Consumer Preferences: Towards a Psychological Theory of Rebound Effects. *Ecological Economics, 146*(May 2017), 414–424. https://doi.org/10.1016/j.ecolecon.2017.12.009
Saphores, J. M., Ogunseitan, O. A., & Shapiro, A. A. (2012). Resources, Conservation and Recycling Willingness to engage in a pro-environmental behavior: An analysis of e-waste recycling based on a national survey of U. *S. households. "Resources, Conservation & Recycling", 60*, 49–63. https://doi.org/10.1016/j.resconrec.2011.12.003
Schultz, P. W., Messina, A., Tronu, G., Limas, E. F., Gupta, R., & Estrada, M. (2014). Personalized Normative Feedback and the Moderating Role of Personal Norms: A Field Experiment to Reduce Residential Water Consumption. *Environment and Behavior, 48*(5), 686–710. https://doi.org/10.1177/0013916514553835
Schultz, P. W., & Zelezny, L. C. (1998). Values and Proenvironmental Behavior: A Five-Country Survey. *Journal of Cross-Cultural Psychology, 29*(4), 540–558. https://doi.org/10.1177/0022022198294003
Schwartz, S. H. (1992). Universals in the content and structure of values: Theoretical advances and empirical tests in 20 countries. *Advances in Experimental Social Psychology, 25*, 1–65.
Schwartz, S. H. (1994). Are There Universal Aspects in the Structure and Contents of Human Values? *Journal of Social Issues, 50*(4), 19–45. https://doi.org/10.1111/j.1540-4560.1994.tb01196.x
Sloot, D., Kutlaca, M., Medugorac, V., & Carman, P. (2018). Recycling alone or protesting together? Values as a basis for pro-environmental social change actions. *Frontiers in Psychology, 9*(JUL), 1–10. https://doi.org/10.3389/fpsyg.2018.01229
Steg, L., & de Groot, J. I. M. (2012). *Environmental Values*. Oxford University Press. https://doi.org/10.1093/oxfordhb/9780199733026.013.0005.
Steg, L., Perlaviciute, G., van der Werff, E., & Lurvink, J. (2014). The Significance of Hedonic Values for Environmentally Relevant Attitudes, Preferences, and Actions. *Environment and Behavior, 46*(2), 163–192. https://doi.org/10.1177/0013916512454730
Taylor, S. E., & Fiske, S. T. (1975). Point of view and perceptions of causality. *Journal of Personality and Social Psychology, 32*(3), 439–445. https://doi.org/10.1037/h0077095
Thøgersen, J. (2004). A cognitive dissonance interpretation of consistencies and inconsistencies in environmentally responsible behavior. *Journal of Environmental Psychology, 24*(1), 93–103. https://doi.org/10.1016/S0272-4944(03)00039-2
Thøgersen, J., & Ölander, F. (2002). Human values and the emergence of a sustainable consumption pattern: A panel study. *Journal of Economic Psychology, 23*(5), 605–630. https://doi.org/10.1016/S0167-4870(02)00120-4
Thøgersen, J., & Ölander, F. (2003). Spillover of environment-friendly consumer behaviour. *Journal of Environmental Psychology, 23*(3), 225–236. https://doi.org/10.1016/S0272-4944(03)00018-5
Truelove, H. B., Carrico, A. R., Weber, E. U., Raimi, K. T., & Vandenbergh, M. P. (2014). Positive and negative spillover of pro-environmental behavior: An integrative review and theoretical framework. *Global Environmental Change, 29*, 127–138. https://doi.org/10.1016/j.gloenvcha.2014.09.004
Truelove, H. B., & Gillis, A. J. (2018). Perception of pro-environmental behavior. *Global Environmental Change, 49*(February), 175–185. https://doi.org/10.1016/j.gloenvcha.2018.02.009
van der Werff, E., Steg, L., & Keizer, K. (2013). The value of environmental self-identity: The relationship between biospheric values, environmental self-identity and environmental preferences, intentions and behaviour. *Journal of Environmental Psychology, 34*, 55–63. https://doi.org/10.1016/j.jenvp.2012.12.006
Venema, T. A. G., Kroese, F. M., Verplanken, B., & de Ridder, D. T. D. (2020). The (bitter) sweet taste of nudge effectiveness: The role of habits in a portion size nudge, a proof of concept study. *Appetite, 151*, Article 104699. https://doi.org/10.1016/j.appet.2020.104699
Verplanken, B., Marks, E., & Dobromir, A. I. (2020). On the nature of eco-anxiety: How constructive or unconstructive is habitual worry about global warming? *Journal of*

Environmental Psychology, 72, Article 101528. https://doi.org/10.1016/j.jenvp.2020.101528

Verplanken, B., Walker, I., Davis, A., & Jurasek, M. (2008). Context change and travel mode choice: Combining the habit discontinuity and self-activation hypotheses. *Journal of Environmental Psychology, 28*(2), 121–127. https://doi.org/10.1016/j.jenvp.2007.10.005

Vinckier, F., Rigoux, L., Kurniawan, Irma, T., Hu, C., Bourgeois-Gironde, S., Daunizeau, J., & Pessiglione, M. (2019). Sour grapes and sweet victories: How actions shape preferences. *PLoS Computational Biology*, 1–24.

Volland, B. (2017). The role of risk and trust attitudes in explaining residential energy demand: Evidence from the United Kingdom. *Ecological Economics, 132*, 14–30. https://doi.org/10.1016/j.ecolecon.2016.10.002

Wansink, B., & Sobal, J. (2007). Mindless Eating: The 200 Daily Food Decisions We Overlook. *Environment and Behavior, 39*(1), 106–123. https://doi.org/10.1177/0013916506295573

Weber, S., Burger, P., Farsi, M., Martinez-Cruz, A. L., Puntiroli, M., Schubert, I., & Volland, B. (2017). Work Package 2: Change of Behavior SCCER CREST Swiss Household Energy Demand Survey (SHEDS): Objectives, Design, and Implementation. *SCCER CREST Working Paper, October*.

Whitmarsh, L., & O'Neill, S. (2010). Green identity, green living? The role of pro-environmental self-identity in determining consistency across diverse pro-environmental behaviours. *Journal of Environmental Psychology, 30*(3), 305–314. https://doi.org/10.1016/j.jenvp.2010.01.003

Wickham, H. (2016). *ggplot2: Elegant Graphics for Data Analysis*. https://ggplot2.tidyverse.org.

Wilcox, R. R. (2011). *Introduction to Robust Estimation and Hypothesis Testing* (1st ed.). Sabre Foundation.

Wood, W. (2019). *Good habits, bad habits: The science of making positive changes that stick*. Macmillan.

Wood, W., & Neal, D. T. (2007). A new look at habits and the habit-goal interface. *Psychological Review, 114*(4), 843–863. https://doi.org/10.1037/0033-295X.114.4.843

Wood, W., & Rünger, D. (2016). Psychology of habit. *Annual Review of Psychology, 67* (January), 289–314. https://doi.org/10.1146/annurev-psych-122414-033417

Wynes, S., & Nicholas, K. A. (2017). The climate mitigation gap: Education and government recommendations miss the most effective individual actions. *Environmental Research Letters, 12*. https://doi.org/10.1088/1748-9326/aab213

Dr. Michael Puntiroli is a senior researcher at the Institute of Management, Faculty of Economics and Business, University of Neuchâtel, Switzerland. Michael is also an associate researcher for SCCER CREST, which brings together almost all major Swiss research institutions and cooperates closely with partners from industry, public administration, and policy consulting. He holds a Ph.D. in cognitive psychology from the University of Geneva, Switzerland, and his research interests focus on visual attention and marketing communication.

Dr. Lisa S. Moussaoui is lecturer and research fellow at the Faculty of Psychology and Education Sciences, University of Geneva, in the Health Psychology Research Group. Her research interests and publications focus upon behavior change for health promotion and sustainability. Lisa is also the founder of a consulting firm working with policy makers and international organizations for projects involving behavior change.

Dr. Valéry Bezençon is a full professor of marketing at the Institute of Management, Faculty of Economics and Business, University of Neuchâtel. His research interests and publications revolve around transformative consumer research. He also advises and trains organizations to help them change behaviours for the common good.