



# The utility of using a top-down conduct-of-life-based approach for explaining energy consumption behaviour: evidence from Switzerland

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**Abstract** Programmes for reducing household energy consumption have so far shown only minor effects. The literature offers many explanations for this, such as rebound effects, efficiency paradox and culturally rooted daily routines. In addition, interventions are often designed in a one-size-fits-all manner and do not account for societal differences through segmentation and tailored interventions. One of the challenges associated with the implementation of tailored interventions is the lack of agreement on how to identify societal segments, and the lack of clarity on which segment should be addressed by which type of intervention. Against this backdrop, we explore the applicability of the theory-driven Otte conduct of life segmentation with three energy consumption behaviours. Utilizing survey data from 5015 respondents, we demonstrate that there are significant conduct-of-life-specific differences in showering, endowment with information and entertainment electronics and air travel. The only two conduct of life groups who demonstrate consistent behavioural patterns across

the three behaviours are the reflexives, who consistently over-consume, and conventionalists, who consistently under-consume energy. We put forward suggestions on how to apply our findings to tailor interventions.

**Keywords** Household energy consumption · One-size-fits-all · Segmentation · Tailored interventions · Conduct of life groups · Behaviour change

## Introduction

Many countries, especially in Europe, are committed to decarbonising their societies, including both greening their energy mix and reducing their energy consumption (British Department of Energy and Climate Change, 2012; Danish Government, 2013; Dutch Ministry of Economic Affairs, Agriculture and Innovation, 2011; German Federal Ministry for Economic Affairs & Energy, 2014). The Swiss Energy Strategy 2050, for example, calls for a 50% reduction of per capita energy consumption by 2050 (Swiss Federal Council, 2013). Since private households in industrialised countries generate around 40% of country-level greenhouse gas emissions through their energy consumption at home and travel behaviour (Wolske et al., 2020), they play a major role in achieving these reduction goals.

Therefore, households are a relevant target for energy conservation programmes (González-Torres et al., 2022), which have so far mainly shown only

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small success rates. One suggested measure for improving the effectiveness of energy conservation programmes is to tailor policy and intervention design to specific population segments (Abrahamse & Steg, 2013; Abrahamse et al., 2005; Axon, 2017; Klöckner, 2015; Seidl et al., 2017; Whitmarsh & O'Neill, 2010). A number of considerations provide a rationale for this suggestion. For example, consumers are different regarding their norms, values and attitudes, argued to be important factors explaining energy consumption behaviour (Ababio-Donkor et al., 2020; Bouman et al., 2021; Breukers et al., 2013). These differences manifest in manifold ways in relation to how life is being conducted. In addition to norms, values and attitudes, there are also symbolic meanings, making everyday practices more visible to peers and allowing social differentiation. Moreover, sociodemographic differences such as age, income, gender and place of living also have an impact on behaviour (Filippini & Wekhof, 2021; McLoughlin et al., 2012; Tweed et al., 2015). Because of these individual differences, it is reasonable to expect that people react differently to various interventions and instruments (Bornemann et al., 2018).

Arguments in favour of tailored interventions, however, do not provide the answer to the question which segmentation approach to choose. There are many segmentation approaches, and results vary depending on the factors included and methods chosen. While demographic and geographical approaches, for example, are attractive because of their simplicity and data availability, lifestyle-based approaches<sup>1</sup> cover practices of daily life of the target population, such as people's leisure time activities, motivational factors, attitudes, values and personality traits (Klöckner, 2015). The aim of this study is to explore the applicability of a lifestyle-based segmentation approach that allows the reliable identification of replicable societal groups and investigate

group-specific differences in energy consumption behaviour. For this purpose, we rely on the Otte's conduct of life typology (2004), which is accessible without restrictions, well documented, replicable and easily constructed based on ten survey questions. Conduct of life is thereby defined as "cross-cutting, regulating instances that guide the expression of specific attitudes and behaviours in specific fields of life (Otte, 2004, p. 91)",

There are different rationales and research interests motivating studies on segmentation for tailoring interventions. Most segmentation studies in energy research derive their segments using a data-driven, cluster-analytic approach. Seidl et al. (2017), for example, derive four segments ((1) homeowners with a car affinity; (2) high standard of living but conscious consumption; (3) sufficient consumption; (4) middle group with potential) from an online survey with 706 respondents from three Swiss cities. The segments are built based on fourteen behavioural items capturing energy-relevant behaviour of the respondents. In a similar vein, Sütterlin et al. (2011) derive six types of energy savers ((1) idealistic; (2) selfless inconsequent; (3) thrifty; (4) materialistic; (5) convenience-oriented indifferent; (6) problem-aware, well-being oriented) based on a Swiss survey of 1292 respondents, taking into account a comprehensive selection of items describing purchasing and curtailment behaviours, acceptance of policy measures and psychological determinants of energy consumption. Barr and Gilg (2006), again applying a cluster-analytic approach to a UK sample, identify four lifestyle groups ((1) committed environmentalists; (2) mainstream environmentalists; (3) occasional environmentalists; (4) non-environmentalists) in relation to environmental behaviours in and around the home. Their segments were based on 36 items focussing on energy saving, water conservation, waste management and green consumption. In a study based on a representative sample of 711 household from San Diego, Axsen et al. (2012) derive five clusters based on lifestyle practices, pro-environmental attitudes and openness to lifestyle change ((1) engaged, (2) aspiring, (3) low-tech, (4) traditionalists and (5) techies) and explore their change potential in three examples of pro-environmental technologies (PETs): electric vehicles, solar panels and a green electricity program. They find out that "engaged" and "aspiring" greens are attracted to all three PETs, while "low-tech"

<sup>1</sup> The lifestyle research literature uses a variety of different terminologies describing lifestyle-based choices and thinking patterns, such as lifestyle, conduct of life, social milieu. However, there are no universally accepted definitions for these terms. Therefore, throughout the paper we use the term "lifestyle-based" (approaches, segmentations or typologies) not only to describe lifestyles, but also to other constructs from the lifestyle research literature, which are closely related to lifestyles, such as conducts of life or social milieus.

greens report mild interest in green electricity only. Non-green “techies” only report interest in solar panels, while “traditionalists” report uniformly low PET interest. Still other segments are developed in Jansson et al. (2009), who came up with three clusters based on a sample of 1832 Swedish car owners ((1) non-greens, (2) curtailers, and (3) ecovators). The clusters are based on the respondents’ values, beliefs, norms, habits and personal capabilities. They found that “ecovators” (ecological innovators) had the highest levels of green beliefs and were found to be the most receptive to alternative fuel vehicles (AFVs), followed by “curtailers” and “non-greens”. These examples highlight that despite the similarities in settings and methods and despite dealing with similar topics, the identified segments are quite distinct. Many more examples could be added to demonstrate the context-dependency of the resulting segments.

Bottom-up (data-driven) approaches involving cluster analysis provide valuable insights for understanding different segments in their geographical and societal contexts. They also have the advantage of discerning the behaviour in question accurately. Their strength, to be context-related, however, is also their weakness when testing the segments sensitivity towards policy instruments. The results are neither generalizable beyond the specific behaviour and contexts nor replicable.

An alternative to overcome this and to go beyond context-dependency is the application of a top-down (theory-driven) approach, i.e. constructing segments using criteria that are independent of the behaviour in question. One option for such a line of analysis is to use demographic or geographical criteria. Another option is to identify social milieus, as done within the Sinus milieu approach (Sinus Institute 2022), or conduct of life groups, as done by Otte (2004). Such top-down approaches have the advantage of delivering comparable results in different fields as they are not dependent on a specific behaviour.

There are studies that apply lifestyle-based typologies in a descriptive manner. Kleinhüchelkotten and Wegner (2010) and Kleinhüchelkotten (2005), for example, compose sustainability profiles of a German population based on the Sinus milieus, covering a large number of sustainability-related topics, including energy issues. The German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (2013) applies Otte’s conduct

of life typology to describe the different segments regarding mobility behaviour, food purchasing and household organisation (including larger household investments, dwelling type and area).

Another research strand has applied lifestyle-based typologies to understand statistical differences in energy consumption behaviour per group. Hauser (2013) found significant differences in energy consumption related to heating and electricity consumption between Otte’s conduct of life types based on a sample of 772 households from Stuttgart (Germany) and 420 households from Lyon (France). In addition, Kleinhüchelkotten et al. (2016) investigate how well the milieu model Sociodimensions (Institute for Socio-Cultural Research 2023) explains energy consumption and CO<sub>2</sub> emissions in the fields of space and water heating, lighting, household and multi-media devices, daily and holiday mobility, food and garment consumption. Their findings show that distinct energy consumption patterns can be found in different societal segments. For example, social milieus with positive environmental attitudes are associated with above-average energy consumption. Schubert et al. (2020), applying Otte’s conduct of life segmentation, show that there are significant differences in short/medium and long-distance air travel behaviour frequency and likelihood among the different Otte conduct of life groups. Based on these differences and additional factors, they put forward some suggestions for tailored interventions.

Despite the promising results of these pieces of research, top-down segmentation in general and those using Otte’s approach, in particular, are limited to some pioneering examples, such as Hauser (2013) and Schubert et al. (2020). We have decided to apply the Otte segmentation for the following reasons. First, being able to identify replicable societal segments opens up the possibility of designing and testing tailored interventions for different segments context-independently. Second, Otte’s typology was developed to overcome a number of weaknesses of existing lifestyle-based approaches, such as low comparability of the typologies, a lack of theoretical grounding, and the types being too removed from reality and often requiring a high data collection effort (Otte, 2004). Third, unlike the Sinus approach, which is not freely available, Otte’s questionnaire for building the types is accessible and, due to its simple implementation, easily replicable.

Three pilot studies evaluated the usefulness of the Otte typology, in addition to Hauser (2013) and Schubert et al. (2020), and found different energy consumption patterns among the conduct of life groups. However, the pilot studies lacked representativeness in their national contexts. Menn (2011), for example, found differences among Otte's conduct of life groups in sufficiency-oriented mobility behaviour within a non-representative sample of 405 German participants. Arnoux (2013) found conduct-of-life-specific differences in garment consumption in a non-representative online survey of 478 Swiss participants. Finally, Jobin (2015) found differences in the groups' endowments with electronic devices and in electricity-saving behaviour (efficiency and sufficiency related) within a large non-representative sample of 3075 Swiss participants. Although we did not apply these findings to deduce the hypotheses, they functioned as motivating heuristics to evaluate the potential of Otte's conduct of life approach within a larger sample. In doing so, we expect to strengthen research capacities for carrying out well documented, replicable and easily constructable top-down segmentations for studying change of energy-related behaviours.

Against this backdrop, this study contributes to the field of segmentation approaches regarding energy consumption behaviour, by assessing the potential of a promising, well-documented lifestyle-based approach. The paper strives to answer the following research question: To what extent do segments defined by a lifestyle-based, top-down segmentation differ in their energy consumption behaviour? The paper is organised as follows. In Section "[Theoretical background](#)", we provide the theoretical background for the paper. In Section "[Theoretical foundation of the Otte conduct of life typology](#)", we describe our data set and present descriptive statistics of our independent and dependent variables. After presenting our results in Section "[Description of Otte's dimensions and conduct of life groups](#)", we discuss them in Section "[Investigated types of energy consumption behaviour](#)". A short conclusion, including avenues for further research, is provided in Section "[Hypotheses on conduct of life differences in energy consumption behaviour](#)".

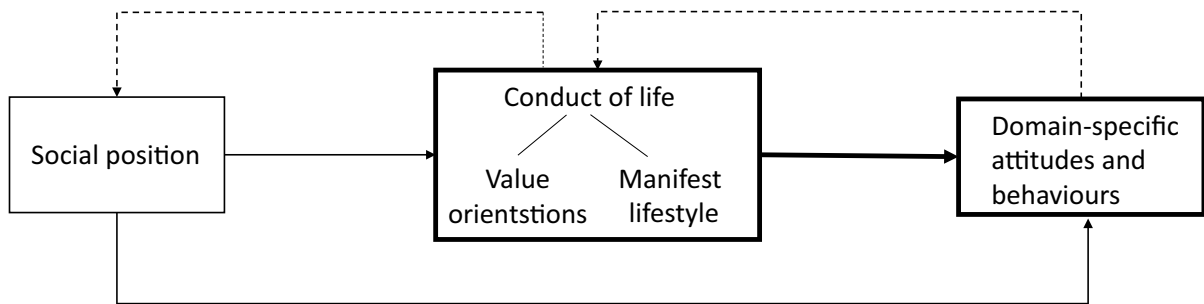
## Theoretical background

This section first sketches the underlying theoretical foundation regarding the relation between conduct of life and behaviour (2.1) and continues by describing Otte's conduct of life typology (2.2). We selected this typology mostly for pragmatic reasons, as it is a well-documented theory-based approach within the lifestyle research literature, which is usable for quantitative analysis. Furthermore, it is directed to individual's performances rather than capitals, and provides a non-commercial, relatively simple set of questions for building the segments. We do not claim that this conduct of life approach is the most theoretically sound or best segmentation approach, but it serves as a suitable example for what we are interested in, which is to carry out an empirical study on prospects for top-down segmentation approaches.<sup>2</sup> While we explain the selection of energy consumption behaviours, which we analyse in this paper, in Section 2.3, we present our hypotheses regarding the relation between conduct of life and energy consumption behaviour in Section "[Description of Otte's dimensions and conduct of life groups](#)".

### Theoretical foundation of the Otte conduct of life typology

Otte's (2004) basic model for interaction between conduct of life, behaviour and social position (Fig. 1) distinguishes between a visible (manifest lifestyle) and a mental component of conduct of life (e.g., value orientations). According to Otte (2004), the subjective expression of conduct of life depends on the objectively available resources and restrictions, i.e., the social position of the individual. The term "social position" describes the objective position of a person within a societal structure. This position is defined by the available resources and restrictions resulting from different socio-demographic factors, such as occupation, income, education, cohort, age and gender. The subjective processing of the social position

<sup>2</sup> Hence, our aim is to provide an empirical contribution by abstracting away from the comprehensive debate about the competing theoretical approaches within the lifestyle research literature.



**Fig. 1** Otte's model explaining the interplay of social position, conduct of life and behaviour. Source (Otte 2004)

by different actors then results in different conducts of life manifested in observable lifestyles.

The two components of conduct of life — the value orientations and the manifest lifestyle — largely shape the organisation of everyday life. This is illustrated in the bold part of Fig. 1 with the arrow connecting conduct of life with the domain-specific attitudes and behaviours. While value orientations represent fundamental principles of what a person considers to be the desired life concept, the manifest lifestyle is composed of symbols and activities that make the everyday life visible to the outside world.

#### Description of Otte's dimensions and conduct of life groups

Otte (2004) defines two central dimensions of social space: the level of endowment (in terms of material and cultural resources) and the time dimension (which simultaneously refers to cohort-specific modernity and biographical perspective). Thereby, the dimensions of social space should not be interpreted from the social status perspective, but from the conduct of life perspective. Thus, the endowment dimension does not suggest resource endowment, but rather the endowment with objects and activities produced with the available resources. Also, the time dimension is not meant as a synonym for age, but indicates how open the biographical perspective is (e.g., open=some major investments in the own biography is still possible, closed=all major investments in the own biography has already been made). Accordingly, it is, for example, possible that an elderly person can transform his or her biographical perspective from a closed or consolidated into an open one. Conduct of life group membership was

defined by the combination of the categories on the endowment and modernity dimensions. The resulting typology together with a short qualitative description of conducts of life is shown in Table 1.

#### Investigated types of energy consumption behaviour

We selected the following three behaviours to investigate potential differences among the segments: showering frequency, endowment with information and entertainment electronics (IEE) and air travel frequency. Reasons for choosing these behaviours are fourfold. First, they involve three main fields of energy consumption,<sup>3</sup> as defined by Burger et al. (2015): water and space heating,<sup>4</sup> electricity,<sup>5</sup> and mobility.<sup>6</sup> Second, they vary in their monetary value

<sup>3</sup> We want to highlight that our intention is not to transfer results related to showering, endowment with IEE and air travel to the entire domains of heating, electricity consumption and mobility. We are aware that the three above-named domains are much more diverse than that.

<sup>4</sup> We chose water heating because it is an important source of energy consumption in private households, making up 14.4% of the total energy consumption of private households in Switzerland (Swiss Federal Office of Energy 2019). Moreover, with the progress in building technology and increasingly stringent building codes, its share of total energy consumption in private households is continuously increasing and amounts to, for example, around 43% in a typical passive house (Tiefenbeck et al. 2014).

<sup>5</sup> We chose IEE because it is closely related to leisure, culture and consumption—the domains on which Otte's typology is based.

<sup>6</sup> We chose flying frequency because of the substantial contribution of air travel to global climate change (Lenzen et al., 2018) and with, for example, 56% of the EU residents having made at least one personal air travel trip in 2021 (Eurostats 2021), this behaviour, with an upward trend, requires attention, at least in the western world.

**Table 1** Otte's typology

Modernity/biographical perspective			
		<i>Semi-modern</i>	<i>Modern</i>
		<i>Traditional</i>	
<b>Endowment</b>	<i>High</i>	<p><b>Conservatives</b> Tradition of possession-oriented bourgeoisie, conservatism, distinction through hierarchy, exclusivity in living standard, classical high culture, willingness to perform and lead, religiousness</p>	<p><b>Liberals</b> Tradition of the education-oriented bourgeoisie, liberal worldviews, professional self-fulfilment, high culture consumption with an alternative touch, a sense of authenticity, connoisseurship in consumption</p>
	<i>Middle</i>	<p><b>Conventionalists</b> Tradition of petite bourgeoisie, values of duty and acceptance, security orientation, consumption of high culture with a folkloric touch, conservative-religious morality, domestic idyll</p>	<p><b>Advancement-oriented</b> Orientation towards a solid professional career, family and participation in the mainstream of modern leisure activities, internal heterogeneity through their position exactly in the middle of the endowment-modernity space</p>
	<i>Low</i>	<p><b>Traditional workers</b> Tradition of skilled work, modesty, practical orientation, importance of social security, closeness to trade unions, folk songs, affinity to engagement in associations</p>	<p><b>Home-centred</b> Family orientation and domesticity due to children and low resource availability, traditional folk festival scene and modern mass culture such as pop music and television</p>
			<p><b>Reflexives</b> Cultural, academic avant-garde, reflexivity, creativity and joy of experimentation, search for self-reliant personality development, global orientation</p>
			<p><b>Hedonists</b> Youth culture style protest through fashion and music, innovative spirit, short-term pleasure and consumption orientation, extraversion, urban events and club culture</p>
			<p><b>Entertainment-oriented</b> Adventure consumerism, materialistic status symbolism and out-of-home entertainment orientation (otherwise threat of declassification), depoliticisation</p>

Adapted from Otte (2005, Fig. 1, p. 452 and Table 2, p. 454)

and cover high-cost behaviours (air travel frequency, endowment with IEE) and low-cost behaviours (showering frequency). Third, the behaviours represent one-time behaviours (endowment with IEE) and routine behaviours (showering frequency, air travel frequency). Fourth, they reflect behaviours performed at home (showering frequency, endowment with IEE) and in a holiday context (air travel frequency). Hence, selecting these behaviours reflects the intention to cover a range of behaviours that are different in several key aspects. Moreover, other studies dealing with lifestyles focused on similar behaviours and present an opportunity to reflect on findings in relation to other research. Lorimer et al. (2013) showed that lifestyles associated with hedonism, such as the hedonists from the Otte typology, tend to have increased hot water consumption, including showering. Lee et al. (2009) found that lifestyle factors, such as fashion consciousness, leisure orientation, internet affinity and e-shopping preferences, influence the intention to purchase high-tech products, including IEE. Finally, Schubert et al. (2020) found that Otte conduct of life types are particularly important for explaining short- to middle-distance air travel for private purposes, showing that liberals, hedonists and reflexives are more likely to be frequent short/middle-distance flyers.

#### Hypotheses on conduct of life differences in energy consumption behaviour

We derived our hypotheses regarding the conduct of life differences in showering, endowment with IEE and air travel (see Table 2) based on the previous work by Schubert et al. (2020), Hauser (2013) and German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (2013), which all applied Otte's conduct of life typology. We also consulted Kleinhüchelkotten (2005) and Kleinhüchelkotten and Wegner (2010), which applied the Sinus milieus concept, for the development of our hypotheses. Applying the findings of Kleinhüchelkotten (2005) and Kleinhüchelkotten and Wegner (2010) to develop hypotheses for Otte's conduct of life groups required matching of the Sinus milieus version used by Kleinhüchelkotten (2005) and Kleinhüchelkotten and Wegner (2010) to Otte's conduct of life groups. We relied in this regard on the matching previously conducted

**Table 2** Conduct of life tendencies regarding showering, endowment with IEE and air travel

	Showering	Endowment with IEE	Air travel
Traditional workers	0	-	-
Conventionalists	-	-	-
Conservatives	-	0	-
Home-centred	+	0	0
Advancement-oriented	-	+	0
Liberals	+	+	+
Entertainment-oriented	+	0	+
Hedonists	+	+	0
Reflexives	-	+	0

+ A higher frequency of showering, endowment with IEE or frequency of air travel is expected within this group compared to most other groups

– A lower frequency of showering, endowment with IEE or frequency of air travel is expected within this group compared to most other groups

0: No significantly higher or lower frequency of showering, endowment with IEE or frequency of air travel is expected within this group compared to most other groups

by Jobin (2015) and Arnoux (2013).<sup>7</sup> We are aware that matching between Sinus milieus and Otte conduct of life groups has to be taken with caution. However, given the very scarce literature on Otte's approach in energy consumption and travel behaviour research and a high level of comparability of the two typologies (two-dimensional social space, comparable definition of the two dimensions, trichotomized dimensions in both cases as well as subjective interpretation of the dimensions), we believe that the matching is justifiable for formulating hypotheses.

#### Showering

Different groups vary in their openness to apply sufficiency measures in their everyday life (Kleinhüchelkotten, 2005; German Federal Ministry for The Environment, Nature Conservation and Nuclear

<sup>7</sup> Jobin (2015) and Arnoux (2013) assume following alignment: traditional workers = tradition-oriented; conventionalists = tradition-oriented, GDR-nostalgics; conservatives = conservatives, established elite; home-centred = consumer-materialists; advancement-oriented = middle class, GDR-nostalgics; liberals = post-materialists, modern performers; entertainment-oriented = hedonists; hedonists = experimentalists; reflexives = post-materialists, modern performers.

Safety, 2013; Hauser, 2013). Some groups are very open and have already implemented some energy-saving measures in the home, amongst them are conventionalists, conservatives, advancement-oriented and reflexives. Others are not open or even dislike sufficiency measures which require attention, namely home-centred, liberals, entertainment-oriented and hedonists, and thus are more likely to display higher frequency of shower behaviour. A third group, only containing traditional workers, does not display a strong preference in either direction and are thus classed as average showering consumers.

#### *Endowment IEE*

We expect low endowment with IEE due to a generally low endowment with electrical appliances, in particular for the traditional workers and conventionalists (Kleinhüchelkotten & Wegner, 2010). On the other hand, we expect high endowment with IEE for advancement-oriented, liberals, hedonists and reflexives due to generally high endowment with electrical appliances and affinity to technical solutions (Kleinhüchelkotten & Wegner, 2010). Finally, some groups, such as conservatives, home-centred and entertainment-oriented are expected to have average endowment with IEE, since they do not show clear tendencies regarding the endowment with these devices.

#### *Air travel*

The group differences in air travel can be expected as well. Some groups such as traditional workers, conventionalists and conservatives do not generally travel a lot and, if they do, they prefer to stay within the national borders use rather bus or train as a means of transport (Kleinhüchelkotten, 2005). Other groups, such as liberals and entertainment-oriented, generally like to travel, including longer trips to foreign countries, and do not mind taking plane to reach their destinations (Kleinhüchelkotten, 2005). According to Kleinhüchelkotten's (2005) findings the home-centred, advancement-oriented, hedonists and reflexives do not show clear tendencies regarding air travel and are thus expected to be average air travellers. Schubert et al.'s (2020) results on air travel frequency for short/middle distance flights show that the home-centred do not differ significantly from the advancement

group, so showing no higher or lower air travel frequency than that group.

More detail regarding the formulation of the hypotheses is presented in Appendix 3.

We summarise the hypotheses presented in Table 2 as follows:

*H1: There are significant differences between the conduct of life groups with regard to showering behaviour, endowment with IEE and air travel.*

*H2: Home-centred, liberals, entertainment-oriented and hedonists take more showers, whereas conventionalists, conservatives, advancement-oriented and reflexives take less showers than the other conduct of life groups.*

*H3: Advancement-oriented, liberals, hedonists and reflexives are more endowed with IEE, whereas traditional workers and conventionalists are less endowed with IEE than the other conduct of life groups.*

*H4: Liberals and entertainment-oriented fly more, whereas traditional workers, conventionalists and conservatives fly less than the other conduct of life groups.*

## **Method**

After describing our data in subsection 3.1, we explain the construction and provide descriptive statistics of our independent (subsection 3.2) and dependent variables (subsection 3.3).

### **Data**

The data analysed in this study were collected as part of the Swiss Household Energy Demand Survey (SHEDS) in 2016. The survey collects data on household energy consumption behaviour and equipment as well as psychological, sociological, economic and demographic determinants (Weber et al., 2017).<sup>8</sup> As shown in Table 3, data collected from 5015

<sup>8</sup> The data is available for academic researchers one year after launching the respective wave upon signing a confidentiality agreement and submitting a short research proposal to make sure that there is no major overlap with the current activities of the research group and the data is not going to be used for commercial purposes. For more on data availability of the SHEDS survey see <https://www.sccer-crest.ch/research/swiss-household-energy-demand-survey-sheds/>



**Table 3** Socio-demographic characteristics

	SHEDS	Switzerland
Age (M, SD)	46.19 (15.34)	41.99 <sup>a</sup>
Female (%)	50.90	50.42 <sup>b</sup>
Education (% tertiary)	40.40	30.30 <sup>c</sup>
Income < 3'000 CHF	5%	7566 <sup>d</sup>
Income 3'000–4'499 CHF	8.4%	
Income 4'500–5'999 CHF	13.5%	
Income 6'000–8'999 CHF	24.8%	
Income 9'000–12'000 CHF	19.8%	
Income > 12'000 CHF	13.6%	
Income “don’t know”	1.9%	
Income “prefer not to say”	12.9%	
Household size (M, SD)	2.25 (1.19)	2.25 <sup>e</sup>
<i>N</i>	5015	8,418,000

<sup>a</sup>Swiss Federal Statistical Office (2016a). <sup>b</sup>Swiss Federal Statistical Office (2018). <sup>c</sup>Swiss Federal Statistical Office (2017a). <sup>d</sup>Swiss Federal Statistical Office (2017b): reports net income, while SHEDS reports gross income. <sup>e</sup>Swiss Federal Statistical Office (2016b)

households are broadly representative of the Swiss population in relation to age, gender and household size. However, the 2016 SHEDS sample is associated with higher levels of education than the Swiss average. This issue was addressed by weighting to take the difference in distribution of the sample’s education levels compared to the Swiss population statistics into account. Regarding income, the comparison with the Swiss population is not possible, since income categories used in the SHEDS survey are different

**Table 4** Short version of Otte’s conduct of life typology

Endowment level	
<i>Material wealth</i>	<i>Cultural capital</i>
(1) I cultivate an upscale standard of life <sup>a</sup>	(3) Visiting art exhibitions or galleries <sup>c</sup>
(2) Restaurant expenditures <sup>b</sup>	(4) Reading books <sup>c</sup>
	(5) Reading a nationwide newspaper, such as NZZ <sup>c</sup>
<i>Modernity/biographical perspective</i>	
<i>Modernity</i>	<i>Biographical perspective</i>
(1) I enjoy my life to the full <sup>a</sup>	(4) I go out often <sup>a</sup>
(2) I live according to religious principles <sup>a, d</sup>	(5) My life pleases me when a lot of activities are taking place <sup>a</sup>
(3) I hold on my family’s old traditions <sup>a, d</sup>	

<sup>a</sup>Formulated on a 1–4 Likert-type scale labelled “does not apply at all” to “applies fully”. <sup>b</sup>Formulated as an open-ended question and transformed into a 1–4 Likert-type scale based on the following rule: 1: < 40CHF; 2: 40–60CHF; 3: 60–100CHF; 4: > 100CHF. This scheme represents our own adaptation of Otte’s original recoding (1: < 20€; 2: 20–30€; 3: 30–50€; 4: > 50€) to the Swiss context. Otte’s original categories (Otte 2013) were multiplied by the ratio of Swiss and German consumer price indices in hotels and restaurants (Swiss Federal Statistical Office 2019) and the exchange rate (OANDA 2020) and rounded to the nearest double-digit number. Since the original categories were constructed in 2013, the figures for the consumer price indices and the exchange rate at the end of 2012 were deployed for the transformation. <sup>c</sup>Formulated on a 1–4 Likert-type scale labelled “never” to “often”. <sup>d</sup>Reversed

from those reported by the SWISS Federal Statistical Office.

Independent variable: Otte’s conduct of life typology

In this paper we use the short version of Otte’s conduct of life typology, which categorizes participants into nine conduct of life groups based on ten survey items—five items for the endowment dimension, and five items for the modernity/biographical perspective dimension. Each item is measured on a scale from 1–4 (see Table 4 for survey items and answer scales). The endowment dimension includes two items for sub-dimension “material wealth” and three items for sub-dimension “cultural capital”. The dimension “modernity / biographical perspective” includes three items for sub-dimension “modernity” and two items for sub-dimension “biographical perspective”. This factorial structure was validated by Otte (2004) for a German sample and re-validated by Hauser (2013) based on a French sample by means of the principal component analysis (PCA). We confirm this structure based on our sample with over 5000 Swiss households (see Appendix Table 8). The only difference between our PCA results and those of Otte (2004) and Hauser (2013) is that the item “reading national newspapers” contributes to both sub-dimensions of endowment in our sample instead of contributing only to the sub-dimension “cultural capital” as in Otte (2004) and Hauser (2013). However, this does

**Table 5** Conduct of life frequencies in the Swiss sample vs. German statistics

	Modernity/biographical perspective		
	<i>Traditional (1.0–2.0)</i>	<i>Semi-modern (2.0–3.0)</i>	<i>Modern (3.0–4.0)</i>
Endowment	<i>High</i> Conservatives (3.0–4.0) (CH: 2.5%, D: 4.4%)	Liberals (CH: 16.6%, D: 15.7%)	Reflexives (CH: 11.3%, D: 7.1%)
	<i>Middle</i> Conventionalists (2.0–3.0) (CH: 6.7%, D: 8.9%)	Advancement-oriented	Hedonists (CH: 17.7%, D: 14.4%)
	<i>Low</i> Traditional workers (1.0–2.0) (CH: 2.7%, D: 4.9%)	Home-centred (CH: 8.8%, D: 12.4%)	Entertainment-oriented (CH: 4.4%, D: 4.9%)

CH Switzerland; D Germany (Otte & Baur, 2008)

not have any implications for the calculation of the endowment dimension.

Dimension variables were calculated as means of the five items. The endowment dimension was then trichotomized taking 2.0 as the threshold between the categories “low” and “middle” and 3.0 between categories “middle” and “high” on the endowment dimension. Similarly, 2.0 was taken as a threshold between the categories “traditional” and “semi-modern” and 3.0 between “semi-modern” and “modern” on the modernity dimension.

Conduct of life frequencies in the study sample were compared to a German sample, as shown in Table 5.<sup>9</sup> A high concentration in the upper right corner of the endowment-modernity/biographical perspective space can be observed, indicating the domination of well-endowed, modern conducts of life in Switzerland, compared to a more balanced distribution in the German sample, which is however more 10 years older (Otte & Baur, 2008).

Dependent variables: three types of energy consumption behaviour

We analysed three energy consumption behaviours: showering frequency, endowment with IEE and air travel frequency. Showering frequency was measured as the reported number of showers taken weekly in the household divided by the household size (i.e., number of people living in the household). Endowment with IEE was measured as the sum of the reported TVs, desktops, laptops and tablets available in the household divided by the household size.

<sup>9</sup> Socio-demographic structure of conduct of life groups compared to the other papers and countries is provided in Appendix Table 9.

Air travel frequency was measured as the sum of the short- or middle-distance and long-distance flights taken by the respondent over the last 12 months for private purposes (no business trips). The descriptive statistics of dependent variables are provided in Table 6.

## Results

We answer our research question by conducting an analysis of variance (ANOVA, Edwards, 2005) including post-hoc pairwise comparisons with Bonferroni correction of the nine Otte conduct of life groups regarding showering frequency, endowment with IEE and air travel. We start by analysing descriptive statistics of showering, endowment with IEE and air travel for each conduct of life group. Comparing the Fig. 2a, b and c suggests that across the behaviours, reflexives and hedonists are associated with the most energy-consuming pattern. Figure 2b shows that weekly showering frequency (i.e., average weekly number of showers per household member) varies from 3.5 for traditional workers to 5.5 for reflexives. Endowment with IEE ranges from 1.9 (conventionalists, conservatives) to 2.2 (hedonists, reflexives and liberals) devices per person, as shown in Fig. 2b. Regarding air travel, Fig. 2c shows that traditional workers are associated with the lowest number of flights (0.7 flights per year on average) and reflexives with the highest number (2.6 flights per year on average).

The ANOVA results show that conduct of life differences are significant regarding all three behaviours: showering ( $F=16.204$ ,  $p<0.001$ ), endowment with IEE ( $F=7.521$ ,  $p<0.001$ ) and air travel ( $F=43.518$ ,  $p<0.001$ ). According to conventions proposed by Cohen (1977, 1992), who

**Table 6** Dependent variables

Variable	M	SD	Min	Max
Showering frequency	4.74	2.45	0	25
Endowment with IEE	2.10	1.22	0	13
Air travel frequency	1.68	1.99	0	10

Showering frequency ( $N=5009$ ): weekly number of showers divided by household size. Endowment with IEE ( $N=5015$ ): sum of the TVs, desktops, laptops, and tablets in the household divided by the household size. Air travel frequency ( $N=5015$ ): number of short-, middle-, and long-distance flights for holiday purposes

considers an effect size of 0.1 as small effect, 0.25 as medium effect and 0.4 as large effect, as measured by Cohen's  $f$ , the effects of conducts of life on showering ( $f=0.16$ ) and endowment with IEE ( $f=0.11$ ) are low, while the effect of conducts of life on air travel is medium ( $f=0.26$ ).

The results of the post hoc pairwise comparisons with Bonferroni correction (see Table 7) suggest that the conduct of life groups could be classified into three groups regarding their influence on showering: (1) those who shower significantly more than the other conduct of life groups, (2) those who shower more than some conduct of life groups, but less than other conduct of life groups and (3) those who shower less than other conduct of life groups. The first group includes reflexives, who shower significantly more than liberals, conservatives, advancement-oriented, conventionalists, home-centred and traditional workers; hedonists, who shower significantly more than traditional workers, conventionalists, advancement-oriented and conservatives; and entertainment-oriented, who shower significantly more than traditional workers and conventionalists. The second group includes home-centred, who shower significantly more than traditional workers and conventionalists, but significantly less than reflexives; advancement-oriented, who shower significantly more than traditional workers and conventionalists, but significantly less than hedonists and reflexives; and liberals, who shower significantly more than traditional workers and conventionalists, but significantly less than reflexives. The third group includes traditional workers and conventionalists, who shower significantly less than home-centred, entertainment-oriented, advancement-oriented, hedonists, liberals and reflexives; and conservatives, who shower significantly less than hedonists and reflexives.

Regarding endowment with IEE, four groups result. The first group includes: reflexives, entertainment-oriented and home-centred, who possess significantly more IEE devices than conventionalists and liberals; and hedonists, who possess significantly more IEE devices than conventionalists and advancement-oriented. The second group includes advancement-oriented, who possess significantly more IEE devices than conventionalists, but significantly less than liberals and hedonists. The third group includes conventionalists, who possess significantly less IEE devices than home-centred, entertainment-oriented, advancement-oriented, hedonists, liberals and reflexives. The fourth group includes traditional workers and conservatives, whose endowment with IEE is not significantly different from any of the other conduct of life groups.

Finally, three groups can be identified with regard to the influence of conduct of life on air travel. The first group includes only reflexives, who fly significantly more than all other conduct of life groups. The second group includes: liberals, who fly significantly less than reflexives, but significantly more than conservatives, advancement-oriented, conventionalists, entertainment-oriented, home-centred and traditional workers; hedonists, who fly significantly less than reflexives, but significantly more than advancement-oriented, conventionalists, entertainment-oriented, home-centred and traditional workers; advancement-oriented, who fly significantly less than reflexives, liberals and hedonists, but significantly more than conventionalists, home-centred and traditional workers. The third group includes: traditional workers, conventionalists and home-centred, who fly significantly less than advancement-oriented, hedonists, liberals and reflexives; entertainment-oriented, who fly significantly less than hedonists, liberals and reflexives; and conservatives, who fly significantly less than liberals and reflexives.

## Discussion

Against the backdrop of the presented results, we can give an affirmative answer to our research question as there are significant conduct of life differences in regards to the three analysed energy consumption behaviours. We interpret this result as an argument for using a top-down approach, like the one suggested

**Table 7** Post hoc pairwise comparisons following ANOVA

		Showering		Endowment with IEE		Air travel	
		M( $\Delta$ )	<i>p</i>	M( $\Delta$ )	<i>p</i>	M( $\Delta$ )	<i>p</i>
Traditional workers	Home-centred	<b>-1.13</b>	<b>0.001</b>	0.04	1.000	-0.35	1.000
	Entertainment-oriented	<b>-1.42</b>	<b>0.001</b>	-0.15	1.000	-0.61	0.074
	Conventionalists	-0.30	1.000	0.34	.143	-0.25	1.000
	Advancement-oriented	<b>-0.97</b>	<b>0.001</b>	0.08	1.000	<b>-0.87</b>	<b>0.001</b>
	Hedonists	<b>-1.38</b>	<b>0.001</b>	-0.12	1.000	<b>-1.24</b>	<b>0.001</b>
	Conservatives	-0.54	1.000	0.16	1.000	-0.70	0.147
	Liberals	<b>-1.20</b>	<b>0.001</b>	-0.13	1.000	<b>-1.39</b>	<b>0.001</b>
	Reflexives	<b>-1.67</b>	<b>0.001</b>	-0.06	1.000	<b>-1.92</b>	<b>0.001</b>
Home-centred	Traditional workers	<b>1.13</b>	<b>0.001</b>	-0.04	1.000	0.35	1.000
	Entertainment-oriented	-0.29	1.000	-0.19	1.000	-0.25	1.000
	Conventionalists	<b>0.83</b>	<b>0.001</b>	<b>0.29</b>	<b>0.012</b>	0.11	1.000
	Advancement-oriented	0.16	1.000	0.04	1.000	<b>-0.52</b>	<b>0.001</b>
	Hedonists	-0.25	1.000	-0.16	0.492	<b>-0.89</b>	<b>0.001</b>
	Conservatives	0.59	0.825	0.11	1.000	-0.35	1.000
	Liberals	-0.07	1.000	-0.18	0.305	<b>-1.03</b>	<b>0.001</b>
	Reflexives	<b>-0.54</b>	<b>0.008</b>	-0.10	1.000	<b>-1.57</b>	<b>0.001</b>
Entertainment-oriented	Traditional workers	<b>1.42</b>	<b>0.001</b>	0.15	1.000	0.61	0.074
	Home-centred	0.29	1.000	0.19	1.000	0.25	1.000
	Conventionalists	<b>1.11</b>	<b>0.001</b>	<b>0.48</b>	<b>0.001</b>	0.36	.758
	Advancement-oriented	0.45	0.193	0.23	0.181	-0.27	1.000
	Hedonists	0.03	1.000	0.03	1.000	<b>-0.63</b>	<b>.001</b>
	Conservatives	0.87	0.063	0.31	1.000	-0.10	1.000
	Liberals	0.22	1.000	0.01	1.000	<b>-0.78</b>	<b>.001</b>
	Reflexives	-0.26	1.000	0.09	1.000	<b>-1.31</b>	<b>.001</b>
Conventionalists	Traditional workers	0.30	1.000	-0.34	0.143	0.25	1.000
	Home-centred	<b>-0.83</b>	<b>0.001</b>	<b>-0.29</b>	<b>0.012</b>	-0.11	1.000
	Entertainment-oriented	<b>-1.11</b>	<b>0.001</b>	<b>-0.48</b>	<b>0.001</b>	-0.36	0.758
	Advancement-oriented	<b>-0.66</b>	<b>0.001</b>	<b>-0.26</b>	<b>0.010</b>	<b>-0.63</b>	<b>0.001</b>
	Hedonists	<b>-1.08</b>	<b>0.001</b>	<b>-0.45</b>	<b>0.001</b>	<b>-0.99</b>	<b>0.001</b>
	Conservatives	-0.24	1.000	-0.18	1.000	-0.46	1.000
	Liberals	<b>-0.90</b>	<b>0.001</b>	<b>-0.47</b>	<b>0.001</b>	<b>-1.14</b>	<b>0.001</b>
	Reflexives	<b>-1.37</b>	<b>0.001</b>	<b>-0.39</b>	<b>0.001</b>	<b>-1.67</b>	<b>0.001</b>
Advancement-oriented	Traditional workers	<b>0.97</b>	<b>0.001</b>	-0.08	1.000	<b>0.87</b>	<b>0.001</b>
	Home-centred	-0.16	1.000	-0.04	1.000	<b>0.52</b>	<b>0.001</b>
	Entertainment-oriented	-0.45	0.193	-0.23	0.181	0.27	1.000
	Conventionalists	<b>0.66</b>	<b>0.001</b>	<b>0.26</b>	<b>0.010</b>	<b>0.63</b>	<b>0.001</b>
	Hedonists	<b>-0.42</b>	<b>0.001</b>	<b>-0.20</b>	<b>0.004</b>	<b>-0.37</b>	<b>0.001</b>
	Conservatives	0.42	1.000	0.08	1.000	0.17	1.000
	Liberals	-0.23	1.000	<b>-0.21</b>	<b>0.003</b>	<b>-0.52</b>	<b>0.001</b>
	Reflexives	<b>-0.71</b>	<b>0.001</b>	-0.14	0.797	<b>-1.05</b>	<b>0.001</b>
Hedonists	Traditional workers	<b>1.38</b>	<b>0.001</b>	0.12	1.000	<b>1.24</b>	<b>0.001</b>
	Home-centred	0.25	1.000	0.16	0.492	<b>0.89</b>	<b>0.001</b>
	Entertainment-oriented	-0.03	1.000	-0.03	1.000	<b>0.63</b>	<b>0.001</b>
	Conventionalists	<b>1.08</b>	<b>0.001</b>	<b>0.45</b>	<b>0.001</b>	<b>0.99</b>	<b>0.001</b>
	Advancement-oriented	<b>0.42</b>	<b>0.001</b>	<b>0.20</b>	<b>0.004</b>	<b>0.37</b>	<b>0.001</b>
	Conservatives	<b>0.84</b>	<b>0.026</b>	0.27	0.970	0.54	0.238
	Liberals	0.19	1.000	-0.02	1.000	-0.15	1.000
	Reflexives	-0.29	0.986	0.06	1.000	<b>-0.68</b>	<b>0.001</b>

**Table 7** (continued)

		Showering		Endowment with IEE		Air travel	
		M( $\Delta$ )	<i>p</i>	M( $\Delta$ )	<i>p</i>	M( $\Delta$ )	<i>p</i>
Conservatives	Traditional workers	0.54	1.000	-16	1.000	0.70	0.147
	Home-centred	-0.59	0.825	-0.11	1.000	0.35	1.000
	Entertainment-oriented	-0.87	0.063	-0.31	1.000	0.10	1.000
	Conventionalists	0.24	1.000	0.18	1.000	0.46	1.000
	Advancement-oriented	-0.42	1.000	-0.08	1.000	-0.17	1.000
	Hedonists	<b>-0.84</b>	<b>0.026</b>	-0.27	0.970	-0.54	0.238
	Liberals	-0.65	0.330	-0.29	0.717	<b>-0.69</b>	<b>0.023</b>
	Reflexives	<b>-1.13</b>	<b>0.001</b>	-0.22	1.000	<b>-1.22</b>	<b>0.001</b>
Liberals	Traditional workers	<b>1.20</b>	<b>0.001</b>	0.13	1.000	<b>1.39</b>	<b>0.001</b>
	Home-centred	0.07	1.000	0.18	0.305	<b>1.03</b>	<b>0.001</b>
	Entertainment-oriented	-0.22	1.000	-0.01	1.000	<b>0.78</b>	<b>0.001</b>
	Conventionalists	<b>0.90</b>	<b>0.001</b>	<b>0.47</b>	<b>0.001</b>	<b>1.14</b>	<b>0.001</b>
	Advancement-oriented	0.23	1.000	<b>0.21</b>	<b>0.003</b>	<b>0.52</b>	<b>0.001</b>
	Hedonists	-0.19	1.000	0.02	1.000	0.15	1.000
	Conservatives	0.65	0.330	0.29	0.717	<b>0.69</b>	<b>0.023</b>
	Reflexives	<b>-0.47</b>	<b>0.018</b>	0.08	1.000	<b>-0.53</b>	<b>0.001</b>
Reflexives	Traditional workers	<b>1.67</b>	<b>0.001</b>	0.06	1.000	<b>1.92</b>	<b>0.001</b>
	Home-centred	<b>0.54</b>	<b>0.008</b>	0.10	1.000	<b>1.57</b>	<b>0.001</b>
	Entertainment-oriented	0.26	1.000	-0.09	1.000	<b>1.31</b>	<b>0.001</b>
	Conventionalists	<b>1.37</b>	<b>0.001</b>	<b>0.39</b>	<b>0.001</b>	<b>1.67</b>	<b>0.001</b>
	Advancement-oriented	<b>0.71</b>	<b>0.001</b>	0.14	0.797	<b>1.05</b>	<b>0.001</b>
	Hedonists	0.29	<b>0.986</b>	-0.06	1.000	<b>0.68</b>	<b>0.001</b>
	Conservatives	<b>1.13</b>	<b>0.001</b>	0.22	1.000	<b>1.22</b>	<b>0.001</b>
	Liberals	<b>0.47</b>	<b>0.018</b>	-0.08	1.000	<b>0.53</b>	<b>0.001</b>

Note.  $N = 5.015$ . Significant differences at  $p = .05$  level in boldface. Bonferroni correction was applied. Traditional workers (endowment: low, modernity: traditional). Conventionalists (endowment: middle, modernity: traditional). Conservatives (endowment: high, modernity: traditional). Home-centred (endowment: low, modernity: semi-modern). Advancement-oriented (endowment: middle, modernity: semimodern). Liberals (endowment: high, modernity: semi-modern). Entertainment-oriented (endowment: low, modernity: modern). Hedonists (endowment: middle, modernity: modern). Reflexives (endowment: high, modernity: modern)

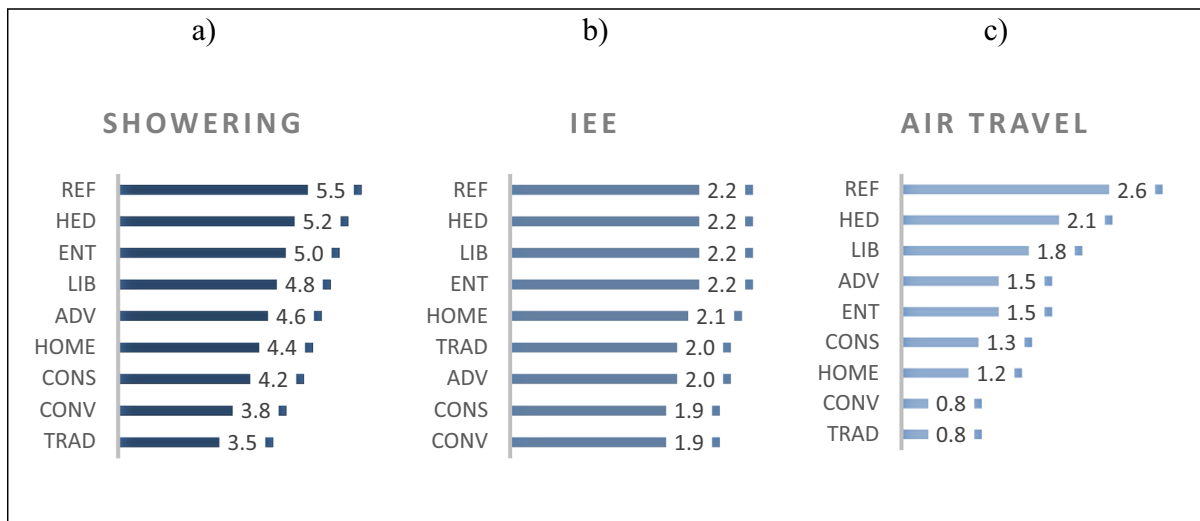
by Otte, as a promising complementary approach to data-driven segmentation. In what follows, we discuss our findings (5.1), look at possible consequences for tailoring interventions (5.2) and reflect on limitations of our study (5.3).

### Summary of the main findings

We find that the Otte conduct of life groups is associated with significant differences in air travel, endowment with IEE and showering behaviour. Hypothesis H1 is hence confirmed. While we find a medium effect of the Otte conduct of life groups on air travel, the effect on showering and the endowment with IEE is small. Hence, the most prominent behaviour differences could be found regarding air travel, followed by showering and endowment with IEE.

### Showering frequency

Our results only partly confirm hypothesis H2. Whilst we confirm the comparatively higher showering frequency among the entertainment-oriented and hedonists and the comparatively low showering frequency among conventionalists and conservatives, the comparatively high showering frequency of reflexives is not in line with our hypothesis. Regarding the hypothesised high showering frequency of the home-centred and liberals and the low showering frequency of advancement-oriented, we find mixed evidence. Since the hypotheses regarding showering frequency were mainly based on how individual groups perceive their own energy-saving behaviour at home, including showering (see Appendix 3, based on German Federal Ministry for The Environment, Nature Conservation



**Fig. 2** Means of showering frequency ( $N=5009$ ), endowment with IEE ( $N=5015$ ) and flights per year ( $N=5015$ ). Horizontal axes are labelled as follows: **a** weekly number of showers per household member; **b** total of desktops, laptops, tablets and smartphones per household member; and **c** flights per year over short, middle and long distances taken by the respondent. TRAD=traditional workers (endowment: low, modernity: traditional); CONV=conventionalists (endowment: middle, modernity: traditional); CONS=conservatives (endowment:

high, modernity: traditional); HOME=home-centred (endowment: low, modernity: semi-modern); ADV=advancement-oriented (endowment: middle, modernity: semi-modern); LIB=liberals (endowment: high, modernity: semi-modern); ENT=entertainment-oriented (endowment: low, modernity: modern); HED=hedonists (endowment: middle, modernity: semi-modern); REF=reflexives (endowment: high, modernity: modern)

and Nuclear Safety, 2013), the mixed results could suggest that reflexives and the advancement-oriented might overstate, while the home-centred might understate their energy conservation efforts at home. In addition, the affinity for technology-driven energy conservation of liberals (Kleinhüchelkotten & Wegner, 2010) should not be interpreted as their complete denial of behavioural measures, such as containing showering frequency. Our results partly confirm those found by Kleinhüchelkotten et al. (2016) that a significant negative relationship exists between simple, precarious lifestyles, which are low income and less educated lifestyle groups (comparable to the traditional workers in the Otte typology), and showering frequency. Our results also confirm those of Hauser (2013) who found that reflexives take significantly more while traditional workers take significantly less showers than the rest of the sample in Stuttgart (Germany), and entertainment-oriented take significantly more while traditional workers and conventionalists take significantly less showers than the rest of the sample in Lyon (France). Our analyses highlight the diversity in behaviour and draw attention to the fact that precise knowledge of the

lifestyle-specific differences in behaviour is key when it comes to taking action.

#### *Endowment with IEE*

Our results also partly confirm hypothesis H3. In particular, a high level of endowment with IEE among liberals, hedonists and reflexives as well as a low level of endowment with IEE of conventionalists can be confirmed. These results are in line with Hauser (2013) who found that hedonists possess significantly more while conventionalists possess significantly less computers than the rest of the sample in Lyon (France). However, while we find mixed support regarding our hypothesised high level of endowment with IEE for the advancement-oriented we find no support regarding our hypothesised low level for traditional workers. Although, the advancement-oriented show higher levels compared to some conduct of life groups they also show lower levels of endowment with IEE than other groups, meaning that they are likely in the middle, showing average endowment with such equipment. Traditional workers also

appear to be average IEE consumers because their endowment does not vary significantly from any other conduct of life groups. Since the hypothesised high endowment with IEE of advancement-oriented and the hypothesised low endowment with IEE of traditional workers is based on previous evidence on endowment with electrical appliances in general (Kleinhüeckelkotten & Wegner, 2010) our results suggest that these two conduct of life groups deviate less from the average when the focus is placed on IEE.

#### *Air travel frequency*

Our results also partly confirm H4. While lower frequencies of air travel among traditional workers, conventionalists and conservatives are confirmed, our hypothesised higher frequency of air travel among liberals and entertainment-oriented are not or only partly. Indeed, we find evidence of low frequency of air travel among the entertainment-oriented, which is contrary to H3. However, liberals, although not the top flyers, only fly less frequently than one group, the reflexives, but fly more frequently than all other conduct of life groups. The low air travel frequency among the entertainment-oriented could be attributed to their moderate propensity to travel (Kleinhüeckelkotten, 2005). We can also confirm the results of Kleinhüeckelkotten et al. (2016), who found a significant negative relationship between the traditional biographical segments (similar to the traditional workers and conventionalist segments in the Otte typology) and the number of holiday trips. Our results are also in line with Schubert et al. (2020) who found that traditional workers were more likely to be non-flyers, hedonists, reflexives and liberals flew more on short/middle-distance flights, and conventionalists flew less on short/middle-distance flights than the advancement-oriented.

Overall, we find that some conduct of life groups behave more consistently than others. For example, reflexives consistently consume more energy than other groups across all three behaviours while conventionalists consume consistently less energy, meaning they fly less, have fewer IEE devices and shower less.

Tailoring interventions: applying intervention types to our findings

The literature on energy conservation interventions is vast, as illustrated for example by Berman et al. (2019), Guo et al. (2018) and Iweka et al. (2019), and

suggests a large variety of classifications. Abrahamse et al. (2005) for example differentiate between antecedent interventions (taking place before the behaviour), such as information on energy saving options, and consequence interventions (taking place after the behaviour), such as feedback about the own energy savings. Others classify interventions into informational and structural (Steg & Vlek, 2009) and soft and hard interventions (Möser & Bamberg, 2008). To illustrate possible implications from a lifestyle-based segmentation for tailoring interventions, we draw on Mosler and Tobias (2007) who classify behavioural interventions into behaviour-generating and behaviour-promoting interventions. Behaviour-generating interventions are aimed at changing preferences for certain behaviours. Behaviour-promoting interventions aim at activating and supporting behaviour change based on existing behavioural preferences. Behaviour-generating interventions can be structural (e.g., command and control, market instruments, infrastructure, products or service provision), targeting conditions under which behaviour is conducted, or person-centred (e.g., knowledge transfer, argumentative persuasion, affective persuasion), aiming to convince and motivate. Behaviour-promoting interventions include situational measures to create behavioural opportunity (e.g., prompts, commitment, feedback and goal setting) or diffusion-related measures to spread the new behaviour to larger populations (e.g., mass media, personal contact, collective actions and building associations).

Following that distinction leads to the conclusion that conduct of life groups consuming more energy, i.e. flying more, showering more, having more IEE devices than other conduct of life groups, such as reflexives, require behaviour-generating interventions directed to changing behaviour. Conversely, conduct of life groups showing tendencies to curb their energy consumption, hence flying less, showering less and owning less IEE devices, meaning those conduct of life groups that are already displaying rather low-carbon behaviour, such as conventionalists, require behaviour-promoting interventions.

#### *Tailored intervention suggestions for showering*

In the case of showering, the entertainment-oriented, hedonists and reflexives seem to be appropriate target groups for behaviour-generating interventions

in Switzerland, because they shower significantly more than other conduct of life groups. Behaviour-generating interventions to change showering behaviour could, for example, promote the installation of real-time hot water consumption feedback devices in showers. In a large-scale field experiment ( $N=5919$ ) with customers from a Swiss energy provider, Tiefenbeck et al. (2016) reported a 22% decrease in energy and water consumption when real-time energy and water consumption feedback was provided during showering. In a related study, Tiefenbeck et al. (2019) showed that substantial reduction in energy consumption (11.4%) was achieved, even with non-voluntary participants—hotel guests from six different hotels (265 rooms,  $N=19,596$ )—where savings had no positive financial implications for the participant.

For behaviour-promoting interventions in regards to showering, traditional workers, conventionalists and conservatives seem to be the most appropriate groups, because these groups shower significantly less than other conduct of life groups. In order to encourage continued water and energy saving during showering, one strategy could be to point out further opportunities for saving water, such as through analogue or digital prompts for turning off the water when soaping. A study investigating compliance found that when signs were placed in university bathrooms reminding students to turn off the water while soaping, this behaviour was increased if they were in a conspicuous place (Aronson & O’Leary, 1982).

Due to their large target group sizes, hedonists and reflexives seem to be especially attractive target groups for behaviour-generating interventions (17.7% and 11.3%, respectively). Looking at their representation in society, conventionalists may be a more interesting target group for behaviour-promoting interventions than traditional workers and conservatives because they are a larger group (6.7% versus 2.7% and 2.5% respectively).

#### *Tailored intervention suggestions for endowment with IEE*

Regarding endowment with IEE, the home-centred, entertainment-oriented, hedonists, liberals, and reflexives may be interesting target groups for behaviour-generating interventions because they possess significantly more IEE devices than the other groups.

Consequently, the aim is to motivate these groups to reduce or change their IEE consumption patterns. One way in which this could be achieved, for example, is through providing information on the importance of the energy consumption of IEE through a personal energy audit. Burger et al. (2019) argue that this kind of intervention is most likely to induce behaviour change if it is repeated and conducted in combination with structural changes.

Furthermore, behaviour-promoting interventions would be appropriate for conventionalists because they possess significantly less devices than the other groups. As this group already owns fewer devices, one way to further reduce energy consumption in relation to IEE devices would be to point out other opportunities to reduce IEE energy consumption, such as through prompts for switching off devices instead of leaving them in a standby mode. Tetlow et al. (2014) showed that introducing prompts to turn off lights before leaving an office significantly increased the likelihood of people doing so. In addition, they found the prompts with normative messages (social norms) were significantly more effective than the ones without them.

In general, when implementing behaviour-generating interventions in relation to IEE endowment special focus should be placed on liberals (16.3%), hedonists (17.9%) and reflexives (11.6%) due to their larger group sizes compared to home-centred (8.8%) and entertainment-oriented (4.4%). On the other hand, conventionalists (6.7%) are the only suitable group for behaviour-promoting interventions.

#### *Tailored intervention suggestions for air travel*

When looking at air travel, our results suggest to consider tailoring behaviour-generating interventions for reflexives, because people belonging to this conduct of life group fly significantly more than all other conduct of life groups. Motivating people to reduce air travel could be achieved, for example by strengthening local leisure activities and local holiday destinations (Schubert et al., 2020). Indeed, studies have suggested that equally positive, emotionally charged or more fulfilling leisure-time alternatives, which could be provided by local holiday destinations, should be promoted to reduce air travel (Malone et al., 2014; Schubert et al., 2020). However, our approach does not yet establish evidence on which specific



interventions could work. This requires additional analyses, e.g. choice experiments or randomised control trials.

Behaviour-promoting interventions should be tailored to traditional workers, home-centred, entertainment-oriented, conventionalists or conservative conduct of life groups because these groups fly significantly less than other conduct of life groups. Behaviour-promoting interventions could, for example, focus on pointing out opportunities for the desired behaviour (using alternative modes of transport, such as going by train). Böhler et al. (2006) argue that a certain subgroup of long-distance travellers who are interested in culture and nature may be open to longer trips by train to holiday destinations within Europe, because they are often environmentally conscious. However, Dolnicar et al. (2010) found that the train as a mode of travel is often associated with the desire for short-haul travel only. Thus, the train could be more vigorously promoted as a transportation mode for short-distance travel. The authors also found that travelling by train is often associated with visiting relatives, travelling to an urban destination and pursuing activities such as biking and hiking at the destination. Hence, specifically offering travel packages focussing on biking, hiking or urban destinations could be used to encourage the train use among short-haul travellers. Traditional workers, conventionalists and conservatives are particularly interesting groups for this measure, since they like travelling by train (Kleinhückelkotten, 2005).

Based on the larger group size of reflexives (11.3%), it may be more suitable to focus on behaviour-generating measures for air travel. However, to reach a tipping point in society, it may also be useful to focus on low-hanging fruit and encourage existing behaviour by focussing on behaviour-promoting interventions for smaller groups, namely traditional workers (2.7%), home-centred (8.8%), entertainment-oriented (4.4%), conventionalists (6.7%) and conservatives (2.5%), who already fly less.

### Summary

In summary, having observed that the reflexives were the only conduct of life group that is consistently associated with higher energy consumption across the three behaviours, we suggest that this group is most suitable for behaviour-generating interventions

regarding all three behaviours. In contrast, conventionalists are the only conduct of life group which show consistently lower energy consumption across the three behaviours, qualifying them as appropriate target groups for behaviour-promoting interventions regarding the above-mentioned behaviours. Developing detailed intervention designs for each group and each behaviour, unfortunately, goes beyond the scope of this study and would also need further empirical testing. We refer interested readers to Kleinhückelkotten and Wegner (2010) who developed recommendations regarding an appropriate channel, design, language, presentation form and cooperation partners for the intervention delivery to the ten Sinus milieus, which are very similar in nature and in labelling to Otte's nine conduct of life groups. Implementing these recommendations in accordance with the mindset of the respective conduct of life groups, as described in Table 1, does not require assignment of each individual person to each individual target group. Indeed, because of the preferences of each group (as described in Table 1), it can be assumed that certain groups could be targeted at certain locations. For example, reflexives and liberals are likely to be found in theatres and certain types of concerts, hedonists in clubs; the thrill and adventure-seeking entertainment-oriented could be found through certain sport activities and the traditional workers, conventionalists and conservatives could be more likely found on public transport. However, these suggestions need to be further verified with similar research to ours, also testing different energy consumption behaviours, to identify intervention points and appropriate types of interventions in those other fields of action.

### Limitations

We explored the potential of the Otte conduct of life typology to illustrate how a top-down lifestyle-based segmentation approach can be used for tailoring interventions. When interpreting the results of our study, however, three limitations should be kept in mind.

First, the conduct of life typology was constructed for the German context with a potential applicability in a Western cultural context (Otte, 2013). From that point of view, applying the typology in Switzerland did not appear problematic. Nevertheless, we tried to

take the Swiss context into account by adapting the item regarding the restaurant bill to reflect the higher price level in Switzerland, as described in the note of Table 4. However, our results cannot easily be extended to countries for which major cultural differences from a Western context are assumed.

Second, it should be kept in mind that our dependent variables are based on self-reported behaviour and might be prone to a frequently observed mismatch between reported and observed behaviour due to social desirability bias (Kormos & Gifford, 2014). However, Vesely and Klöckner (2020) have recently found the magnitude of social desirability bias associated with self-reported pro-environmental behaviour to be relatively small.

Third, the behaviours investigated in this paper provide examples for different behaviour categories (i.e. hot water vs. electricity vs. mobility, low-cost vs. high-cost, one-shot vs. routine) and as such they provide a useful diversity in behaviour to investigate the application of the Otte conduct of life typology. Nevertheless, they are only examples and do not cover the full spectrum of the categories they represent. Furthermore, it might also be possible to find examples with higher CO<sub>2</sub> impact. For example, in addition to number of showers, shower temperature, shower length or bathing frequency are also important drivers of hot water consumption. Likewise, on top of IEE endowment usage patterns of IEE play an important role for electricity consumption. Finally, in addition to air travel, road travel is also an important driver of energy consumption and emissions within the mobility domain. Hence, the exemplary nature of the three behaviours analysed in this paper should be kept in mind when interpreting the results.

## Conclusion

Our results show that the suitability of Otte's theory-driven conduct of life typology varies across energy consumption behaviours, showing more significant group difference for air travel than for showering behaviour and endowment with IEE. We suggest that knowing which conduct of life groups are more energy-consuming or energy-saving across different energy domains could be usefully applied to tailor interventions. In addition, the socio-psychological and sociological foundations behind the conduct of life groups provide a basis for the specific design of the interventions.

Research has already shown that one-size-fits-all policy designs and interventions cannot achieve the necessary change in energy consumption. With our study, we have taken the first step towards finding suitable top-down segmentation strategies to tailor such interventions. We have provided a replicable set of segments and shown, in an exemplary way, how the segmentation could be applied to develop tailored interventions. We think of our study as a pioneering example rather than satisfying the ambitious goal of suggesting a specific approach for tailoring interventions, as studying the applicability of top-down lifestyle-based segmentation approaches to intervention designs in the field of energy and travel behaviour is at its beginning. Against this backdrop, a plethora of further research pathways open. One pathway could compare different top-down approaches, which would provide information on their relative effectiveness. In particular, it would be interesting to compare the explanatory power of simpler top-down segmentation approaches, e.g. approaches based on socio-demographic variables, such as age, gender, income, education or household size, to more complex top-down approaches, such as Otte's one. This could also be done by controlling for socio-demographic variables, when testing the explanatory power of Otte's typology, e.g. within a regression analysis. Another possible pathway could be to analyse group-specific differences regarding additional behaviours from the domains space and water heating, electricity consumption and mobility. Also, it would be interesting to empirically test Otte's conduct of life concept in countries other than Germany, Switzerland and France to see whether the validity of the typology can be extended to other industrialised countries. On the implementation side, more research is needed regarding the appropriate channels for addressing individual Otte conduct of life types by tailored interventions. Relatedly, specific intervention options tailored to different groups need to be developed and tested by means of experimental approaches (whether field or choice experiments). In addition, combining Otte's conduct of life typology with internet of things solutions, e.g. algorithms for recommendations, decision support and automation in a smart-home context, would be a very interesting avenue for further research. Finally, even if Otte has revised his typology in the meantime (Otte, 2019), resulting in 12 instead of 10 items, further research should continue to critically evaluate, whether the number and the choice of items describes the continuously increasing diversity of societies as well as current societal developments well enough.

## Appendix 1

**Table 8** Validating dimensions of Otte's typology by the mean of a principal component analysis

	Material wealth	Cultural capital	Modernity	Biographical perspective
High standard of living	CH: 0.68 D: 0.78 F: 0.61			
Maximum restaurant bill	CH: .0.80 D: 0.72 F: 0.78			
Museums and exhibitions		CH: 0.76 D: 0.75 F: 0.59		
Reading books		CH: 0.76 D: 0.75 F: 0.53		
Reading newspapers	CH: 0.44	CH: 0.59 D: 0.63 F: 0.58		
Religious values			CH: 0.81 D: 0.80 F: 0.69	
Family traditions			CH: 0.84 D: 0.77 F: 0.68	
Enjoying life as much as possible				CH: 0.72 D: 0.80 F: 0.58
Going out much				CH: 0.78 D: 0.73 F: 0.56
A lot of things happening				CH: 0.79 D: 0.79 F: 0.52

Varimax-rotation was applied. Only factor loadings > 0.3 are displayed

Appendix 2

**Table 9** Socio-demographic structure of conduct of life groups

		Modernity/biographical perspective		
		<i>Traditional</i>	<i>Semi-modern</i>	<i>Modern</i>
Endowment	<i>high</i>	Conservatives Age • Hauser (2013): 66 • Tomic (2016): 58.4 • Menn (2011): 58.9 Gender (female) • Otte (2004): 57% • Tomic (2016): 39.5% • Menn (2011): 73% Tertiary education • Otte (2004): 43% • Tomic (2016): 45% • Menn (2011): - Household size • Hauser (2013): 1.85 • Tomic (2016): 2.4	Liberals Age • Hauser (2013): 56 • Tomic (2016): 52.7 • Menn (2011): 42.7 Gender (female) • Otte (2004): 57% • Tomic (2016): 48.5% • Menn (2011): 63% Tertiary education • Otte (2004): 37% • Tomic (2016): 49.6 • Menn (2011): 67% Household size • Hauser (2013): 2.10 • Tomic (2016): 2.3	Reflexives Age • Hauser (2013): 45 • Tomic (2016): 45.7 • Menn (2011): 28.5 Gender (female) • Otte (2004): 45% • Tomic (2016): 50.7% • Menn (2011): 47% Tertiary education • Otte (2004): 36% • Tomic (2016): 53.4% • Menn (2011): 62% Household size • Hauser (2013): 2.08 • Tomic (2016): 2.0
	<i>middle</i>	Conventionalists Age • Hauser (2013): 65 • Tomic (2016): 53.5 • Menn (2011): 52.9 Gender (female) • Otte (2004): 65% • Tomic (2016): 57.8% • Menn (2011): 39% Tertiary education • Otte (2004): 14% • Tomic (2016): 34.2% • Menn (2011): 32% Household size • Hauser (2013): 1.87 • Tomic (2016): 2.5	Advancement-oriented Age • Hauser (2013): 53 • Tomic (2016): 46.9 • Menn (2011): 36.4 Gender (female) • Otte (2004): 56% • Tomic (2016): 49.3% • Menn (2011): 41% Tertiary education • Otte (2004): 19% • Tomic (2016): 40.9% • Menn (2011): 55% Household size • Hauser (2013): 1.98 • Tomic (2016): 2.3	Hedonists Age • Hauser (2013): 45 • Tomic (2016): 38.9 • Menn (2011): 28.3 Gender (female) • Otte (2004): 57% • Tomic (2016): 51.8% • Menn (2011): 42% Tertiary education • Otte (2004): 18% • Tomic (2016): 38.9% • Menn (2011): 49% Household size • Hauser (2013): 1.62 • Tomic (2016): 2.1
	<i>low</i>	Traditional workers Age • Hauser (2013): 64 • Tomic (2016): 50.1 • Menn (2011): 51.5% Gender (female) • Otte (2004): 65% • Tomic (2016): 44.9% • Menn (2011): 17% Tertiary education • Otte (2004): 6% • Tomic (2016): 22.4% • Menn (2011): - Household size: • Hauser (2013): 1.80 • Tomic (2016): 2.3	Home-centred Age • Hauser (2013): 50 • Tomic (2016): 43.4 • Menn (2011): 33.2 Gender (female) • Otte (2004): 57% • Tomic (2016): 45.8% • Menn (2011): 48% Tertiary education • Otte (2004): 8% • Tomic (2016): 28.3% • Menn (2011): 26% Household size • Hauser (2013): 1.85 • Tomic (2016): 2.3	Entertainment-oriented Age • Hauser (2013): 38 • Tomic (2016): 36.3 • Menn (2011): 24.9 Gender (female) • Otte (2004): 50% • Tomic (2016): 47.5% • Menn (2011): 41% Tertiary education • Otte (2004): 5% • Tomic (2016): 28.7% • Menn (2016): 28% Household size • Hauser (2013): 1.79 • Tomic (2016): 2.3

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#### Declarations

**Competing interests** The authors declare competing interests.

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### Appendix 3. Derivation of hypothesis regarding conduct of life differences in energy consumption behaviour

#### Traditional workers

The energy consumption behaviour of the traditional workers is primarily characterised by their general thriftiness orientation (Kleinhüchelkotten & Wegner, 2010, p. 71). However, they evaluate their own sustainability efforts as marginal (German Federal Ministry for The Environment, Nature Conservation and Nuclear Safety, 2013, p. 67). Moreover, they usually own few electrical appliances (Kleinhüchelkotten & Wegner, 2010, p. 71). According to Hauser (2013), they possess a lower number of computers than the rest of the sample based on the data from Stuttgart (Germany) and Lyon (France). Traditional workers have a low propensity to travel and mostly use bus or train as a means of travel (Kleinhüchelkotten, 2005, p. 145). All this suggests a relatively modest endowment with IEE and low frequency of air travel, while

no clear statement can be made regarding showering behaviour.

#### Conventionalists

Conventionalists are expected to use fewer electrical appliances than the other groups for information and communication as well as other household needs (Kleinhüchelkotten & Wegner, 2010, p. 72). They claim that sustainability is important for them as a guiding principle and believe that they succeed well in living up to it in their everyday life (German Federal Ministry for The Environment, Nature Conservation and Nuclear Safety, 2013, p. 68). According to Hauser (2013), they take significantly less showers and possess a significantly lower number of computers than the rest of the sample based on the data from Lyon (France). For the few short trips and holidays they take, they tend to use the bus or train (Kleinhüchelkotten, 2005, p. 147). All this suggests a relatively low frequency of showering, a limited endowment with IEE as well as a low frequency of air travel.

#### Conservatives

The conservatives are characterised by a high level of problem awareness with regard to climate change and a willingness to contribute personally to solve it (Kleinhüchelkotten & Wegner, 2010, p. 67). For example, they take precautionary measures against the possible consequences of climate change (German Federal Ministry for The Environment, Nature Conservation and Nuclear Safety, 2013, p. 69). Technology is not seen as the only solution (Kleinhüchelkotten & Wegner, 2010, p. 70). Rather, they predict proven and well established measures, such as switching off electrical appliances, to become increasingly important (German Federal Ministry for The Environment, Nature Conservation and Nuclear Safety, 2013, p. 69). Conservatives like to spend their holidays at home. They are less likely to use air travel for their holidays. They prefer to travel by car. They also travel by bus and train somewhat more often than the average (Kleinhüchelkotten, 2005, p. 144). All this suggests a relatively low frequency of showering and air travel, while no clear statement can be made regarding the endowment with IEE.

### Home-centred

The home-centred are aware of the discussion about climate change, but it has very little relevance for them in their daily lives and hardly affects their use of energy (Kleinhüchelkotten & Wegner, 2010, p. 73; German Federal Ministry for The Environment, Nature Conservation and Nuclear Safety, 2013, p. 71). Many home-centred people are enthusiastic about electrical appliances, computers and technology. However, this enthusiasm is only reflected to a limited extent in the actual ownership of corresponding devices, as the financial scope is usually not large enough. The willingness to apply energy-saving measures is also relatively low (Kleinhüchelkotten & Wegner, 2010, p. 73). According to their self-assessment the sustainability measures in their own households plays a minor role which is even predicted to decrease in the future (German Federal Ministry for The Environment, Nature Conservation and Nuclear Safety, 2013, p. 71). Finally, home-centred people take few holiday trips, rarely travel abroad and mostly use cars or planes as a means of transport (Kleinhüchelkotten, 2005, p. 150). Schubert et al.'s (2020) results on air travel frequency for short/middle distance flights show that the home-centred do not differ significantly from the advancement group, so showing no higher or lower air travel frequency than that group. All this suggests a relatively high frequency of showering, while no clear statement can be made regarding the endowment with IEE and air travel.

### Advancement-oriented

Advancement-oriented are concerned with climate change issues and are willing to make their own contribution. Their contribution consists primarily in the purchase of energy-efficient appliances, but they are also open for everyday energy-saving behaviour (Kleinhüchelkotten & Wegner, 2010, p. 72). They are convinced that they regularly apply sustainability measures in their households, for example in the field of electricity, water and space heating (German Federal Ministry for The Environment, Nature Conservation and Nuclear Safety, 2013, p. 72). A generally good endowment with electronic appliances indicates that energy consumption is in the upper middle range

(Kleinhüchelkotten & Wegner, 2010, p. 72). The desire to travel, on the other hand, is not particularly pronounced among them. However, they do take at least one holiday trip a year, by car or plane (Kleinhüchelkotten, 2005, p. 148). All this suggests a relatively low frequency of showering as well as extensive endowment with IEE, while no clear statement can be made regarding the frequency of air travel.

### Liberals

Liberals are characterised by a high level of problem awareness regarding climate change and certainly see the need to make their own contribution to climate protection (German Federal Ministry for The Environment, Nature Conservation and Nuclear Safety, 2013, p. 73). Although they claim that they are very successful with sustainability measures in their households (German Federal Ministry for The Environment, Nature Conservation and Nuclear Safety, 2013, p. 74), they are more likely to be prone to the purchase of energy-efficient appliances and other technical solutions as well as innovative business models than to energy-saving behaviour in the everyday life, since they are driven by efficiency, performance and innovation (Kleinhüchelkotten & Wegner, 2010, p. 69). Their openness to measures such as compensation payments for self-emitted greenhouse gases or investments in sustainable energy production (German Federal Ministry for The Environment, Nature Conservation and Nuclear Safety, 2013, p. 74) can also be attributed to their motivational structure described above. Liberals can be expected to consume much electricity, as they are usually well endowed with electrical appliances (Kleinhüchelkotten & Wegner, 2010, p. 69). The propensity to travel among the liberals is relatively high. Many of them take several short trips and long-distance journeys a year. The most common means of travel are the car and the plane. For short trips, the train is also often used (Kleinhüchelkotten, 2005, p. 142). All this suggests a relatively high frequency of showering, extensive endowment with IEE and a high frequency of air travel.

### Entertainment-oriented

Entertainment-oriented attach little importance to sustainability measures in their own households (German

Federal Ministry for The Environment, Nature Conservation and Nuclear Safety, 2013, p. 75). Many of them are irritated by suggestions to use appliances in an energy-saving way (Kleinhüchelkotten & Wegner, 2010, p. 75). Moreover, they see environmental policy measures exclusively as restrictions (German Federal Ministry for The Environment, Nature Conservation and Nuclear Safety, 2013, p. 75). This is why Kleinhüchelkotten and Wegner (2010, p. 75) classify entertainment-oriented as one of the most difficult target groups for energy-saving campaigns. If anything motivates them, it is the argument that one can do more interesting things with the money that does not have to be spent on energy. However, this argument doesn't work well with those who still live with their parents (Kleinhüchelkotten & Wegner, 2010, p. 75). The desire to travel of the entertainment-oriented is moderate. Their travel destinations are often abroad and they mostly use cars or planes as means of transport (Kleinhüchelkotten, 2005, p. 153). All this suggests a relatively high frequency of showering and air travel, while no clear statement can be made regarding the endowment with IEE.2010, p. 74). According to their own statements, they hardly succeed in implementing sustainability measures in their own households and the importance of these measures is continuously decreasing for them (German Federal Ministry for The Environment, Nature Conservation and Nuclear Safety, 2013, p. 76). While hedonists take a longer holiday trip at least once a year somewhat more frequently than the population average, they take shorter holiday trips less frequently by car and more frequently by train (Kleinhüchelkotten, 2005, p. 151). All this suggests a relatively high frequency of showering and modest endowment with IEE, while no clear statement can be made regarding the frequency of air travel.2010, p. 68). In addition, according to Hauser (2013

### Hedonists

Hedonists fully recognise the necessity of climate protection. They are also willing to contribute personally, but often their willingness does not result in an action. On the one hand, they are a young group, with a high affinity to and equipment with new information and communication technologies. On the other hand, they are often on the move, which sets limits to their electricity consumption at home. Hedonists are neither optimistic about the potentials of further

automation in terms of energy consumption reduction nor are very supportive of everyday energy-saving measures that require a lot of attention, such as switching off devices and lights (Kleinhüchelkotten & Wegner,

### Reflexives

The reflexives are aware of the problems of climate change and resource scarcity. They are also open to ecological arguments and often feel responsible to contribute to climate protection. Their level of knowledge about the relationship between energy production and CO<sub>2</sub> emissions is also very high. Nevertheless, reflexives are certainly to be regarded as problematic, since they often have large flats, own many electrical appliances and thus have a high energy demand (Kleinhüchelkotten & Wegner, ), they possess a larger number of computers than the rest of the sample based on the data from Stuttgart (Germany). However, the reflexives claim that they live up to sustainability at home and assume that the importance of sustainability measures at home will increase in the future (German Federal Ministry for The Environment, Nature Conservation and Nuclear Safety, 2013, p. 78). Reflexives like to travel more than population average, mostly by car, although rail is also often considered as an option. They also often spend their holidays within the national borders (Kleinhüchelkotten, 2005, p. 141). All this suggests a relatively low frequency of showering and an extensive endowment with IEE, while no clear statement can be made regarding the frequency of air travel.

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