

On the effect of exposure to information and self-benefit appeals on consumer's intention to perform pro-environmental behaviours: A focus on energy conservation behaviours

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ABSTRACT

Technology providers have clearly understood that considering consumers' behavioural changes is important in developing new technologies, particularly in the energy sector. This study examines the effectiveness of exposure to information and self-benefit appeals in determining the energy conservation behaviours of consumers. In particular, based on an extension of the Theory of Planned Behaviour, we used data from a survey of 450 householders in Tuscany (Italy) to analyse how advertising appeals and the prior exposure to general information about energy conservation influence intentions to undertake energy saving behaviour and invest in different energy efficient technologies. The results suggest that advertising based on self-benefit appeals, which is a communication method typically aimed at producing short-term effects, is effective in promoting reductions in energy consumption and investment in widely-adopted technologies, but cannot increase the interest of consumers in scarcely-adopted ones, which have less associations with repeated exposure to general information about energy conservation. Thus, technology providers should consider combining communication methods with short-term and long-term orientations to successfully turn consumers' informational basis and self-benefit appeals into intentions to perform pro-environmental behaviours. The study concludes with a discussion of its theoretical and managerial implications in the field of market-oriented technology management.

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1. Introduction

Innovation has long been regarded as central to sustainable development, due to the multi-level interactions that determine socio-technical transitions (Smith et al., 2010). Technology providers have clearly understood that, in addition to focusing on the development of new technologies, they must also enable consumers' behavioural changes, particularly in the energy sector (Broman Toft and Thøgersen, 2015). Thus, companies have increasingly promoted sustainable development by combining investment in new technologies and in communication strategies, to

encourage consumers to engage in pro-environmental behaviour (Lee, 2017). Without investment in communication, consumers may resist engaging in activities that require a changing and/or investing behaviour (White and Simpson, 2013). In addition, companies that do not use adequate communication methods are unlikely to effectively promote the adoption of cost-efficient technologies that benefit the environment by reducing material or energy usage (Stern, 2000; Steg and Vlek, 2009), which might be particularly critical for electricity suppliers, technology providers, and energy service companies (ESCOs) as effective approaches to exploiting any potential energy savings at the household level (Zarnikau, 2003).

From this perspective, different communication methods can be used to build both short- and long-term relationships with consumers (Braun-LaTour and LaTour, 2004) by changing the way they encode, store, retrieve, and process product information. These methods typically aim to produce effects in the short-term (e.g. through specific advertising campaigns) or in the long-term (e.g. through a more diluted and repeated exposure to information

Abbreviations: ATB, Attitude towards the behaviour; EETs, Energy efficient technologies; ESBs, Energy saving behaviours; (I)ESBs, (Intention to implement) energy saving behaviours; (I)SPs, (Intention to invest in) solar thermal panels; (I) GSHPs, (Intention to invest in) ground source heat pumps; PBC, Perceived behavioural control; SBA, Self-benefit appeal; SNs, Subjective norms.

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about a certain topic).

Although the factors that can influence a consumer's decision to implement pro-environmental behaviours have been investigated, very few studies have focused on how communication methods with short- and long-term orientations can be combined to produce different energy conservation behaviours (Nguyen et al., 2017). In many studies, the short-term effectiveness of different types of appeals on consumer profiles have been analysed (White and Simpson, 2013; Green and Pelozo, 2014), while some have investigated the long-term effect of prior exposure to information on consumers' attitudes (Braun-LaTour and LaTour, 2004; Huang and Huh, 2018; Schmidt and Eisend, 2015). However, to the best of our knowledge, there are not studies that investigated exposure to information and short-term oriented advertising campaigns to better understand the effects on energy conservation behaviours.

In this study, we focus on the promotion of energy conservation behaviours by distinguishing between the two categories of energy saving behaviours (ESBs) and investment in energy efficient technologies (EETs). ESBs refer to the recurrent implementation of parsimonious behaviours that usually change consumers' everyday lives, such as adjusting thermostat settings to save heat, closing off unused rooms, or switching off lights when leaving a room (Barr et al., 2005; Sütterlin et al., 2011; Testa et al., 2016). Conversely, EETs refer to investment in energy efficient technologies with different levels of previous diffusion and, thus, from a customer perspective, different levels of association with the exposure to general information about energy conservation (Sütterlin et al., 2011; Barr et al., 2005; Gynther et al., 2012). EETs have minimal or no impacts on individual's everyday actions, while they have long-term benefits in terms of energy cost-cutting and improved energy comfort (Sütterlin et al., 2011). Investments in EETs are typically "one-shot behaviours" as they do not need to be repeated (Sütterlin et al., 2011; Stern and Gardner, 1981), and thus consist of decisions attributable to a specific moment in time that might be influenced both by advertising and exposure to information. Thus, by extending the Theory of Planned Behaviour (Ajzen, 1991), which is an influential model of behavioural analysis (Han and Stoel, 2016; Armitage and Conner, 2001), we provide both managerial insights on how to use advertising appeals within wider communication strategies for ESBs or EETs, and also theoretical insights into the distinction between generic and specific intentions to implement energy conservation behaviours.

The paper is structured as follows. Section 2 provides an overview of the literature concerning the study hypotheses. Section 3 describes the data estimation method. Section 4 presents the statistical results, which are discussed in section 5. Section 6 provides theoretical and managerial implications and possible directions for future research.

2. Theoretical background

2.1. Planning for energy conservation behaviours

The general intention to conserve energy at home has an overarching role in determining specific intentions related to ESBs and EETs. According to the Theory of Planned Behaviour (Ajzen, 1991), which has been found effective in predicting energy conservation behaviours (Ajzen et al., 2011) and, in turn, in predicting the related future behaviours, intention represents a conscious decision to perform a behaviour after rational evaluations, and it can be predicted by three determinants: attitude towards the behaviour (ATB), subjective norms (SNs), and perceived behavioural control (PBC). ATB refers to the favourable or unfavourable appraisal of performing a behaviour (Ajzen, 1991), thus increasing or decreasing the likelihood of the behaviour being performed by an individual

(Ajzen, 1991; Yadav and Pathak, 2016; Han et al., 2010). SNs refer to the perceived social pressure from others to conduct or not conduct such behaviour (Ajzen, 1991; Yadav and Pathak, 2016), and PBC is defined as the perception an individual has about having (or not having) the appropriate means and abilities to correctly perform a specific behaviour (Ajzen, 1991; Yadav and Pathak, 2016).

Previous studies provide evidence of the significance of these determinants. Gao et al. (2017) found that ATB and PBC have an influence on energy saving behavioural intentions in the workplace, while Chen (2016) focused on situations where behaviours are more discretionary, and found ATB and SNs to be significant in individual intentions to engage in energy saving and carbon reduction behaviours that can help mitigate climate change. Similarly, Nie et al. (2019) argued that SNs have a more significant effect on the intention to conduct energy saving behaviour than ATB and PBC. We therefore assume that ATB, SNs and PBC can serve as predictors of a householders' general intention to conserve energy at home. Thus, we hypothesise that (see Table 1 for details):

H1. Attitude towards behaviour (ATB), subjective norms (SNs) and perceived behavioural control (PBC) positively influence an individual's general intention to conserve energy at home.

2.2. Differences between general and specific intentions related to energy conservation

The Theory of Planned Behaviour has been used to predict either general or specific intentions to conduct energy conservation behaviours. For example, Ajzen et al. (2011) analysed energy conservation behaviours, including reducing the amount of clothes washing and turning off electric appliances when not in use as part of a general intention to conserve energy. Nie et al., 2019 investigated careful-use behaviour, including turning off televisions instead of leaving them on standby, and assumed that a specific careful-use intention was involved. However, the relationship between specific and general intentions to perform energy conservation behaviours has not been addressed. We consider the extent to which a consumer's willingness to conserve energy is manifested as ESBs and EETs, and assess whether householders' intentions regarding ESBs and EETs differ from the general intention to conserve energy. We therefore hypothesise that:

H2. The general intention to conserve energy positively influences the intention to both implement energy saving behaviours (ESBs) and invest in energy efficient technologies (EETs).

2.3. Communication methods aimed at promoting consumer's energy conservation behaviours

Lee (2017) highlighted that few studies have investigated how companies communicate with consumers to engage them in pro-environmental behaviours through sustainable consumption and purchasing. Companies can use communication strategies based on different communication methods to spread information regarding products or services and thus encourage consumers to engage in pro-environmental behaviours, and particularly energy conservation such as ESBs and EETs (Peattie, 2001; Gadenne et al., 2011). Companies often target consumers through highly-intensive advertising campaigns with a specific focus or through more diluted, general and less structured information flows about products and services. Thus, it is useful to investigate the interaction among methods intended to produce short-term (advertising appeals) and long-term (repeated exposure to information) communication effects (Nguyen et al., 2017).

Table 1

Hypotheses with the hypothesised paths, signs and model used (Source: authors).

Hypothesis	Hypothesised path	Hypothesised sign	Model used
H1	ATB, SNs, PBC → Int.	+	Structural Equation Model
H2	Int. → IESBs, ISPs, IGSHPs	+	
H3-a	SBA-ESBs → IESBs	+	
	SBA-SPs → ISPs		
	SBA-GSHPs → IGSHPs		
H3-b	PBC, SNs > ATB		
H4-a	EXP → IESBs, ISPs, IGSHPs	+	Manova
H4-b	EXP → ATB, SNs, PBC	+	

(EXP = exposure to information; Int = general intention to conserve energy; ATB = Attitude towards the behaviours; SNs = Subjective norms; PBC = Perceived behavioural control; (I)ESBs = (Intention to implement) energy saving behaviours; (I)SPs = (Intention to invest in) solar thermal panels; (I)GSHPs = (Intention to invest in) ground source heat pumps; SBA = self-benefit appeal).

2.3.1. Methods aiming to produce short-term effects on energy conservation: advertising appeals

Companies can use advertising appeals to effectively influence “on-the-spot” consumer behaviours and their determinants. Marketers often rely on the persuasive power of advertising appeals when encouraging consumers’ pro-environmental behaviour (Goldstein et al., 2008; Yang et al., 2015). However, evidence also shows that the capability of advertising appeals to influence consumers’ pro-environmental behaviours depends on the specific behaviour targeted (Menon and Menon, 1997; Mick, 2006). Consumers may be reluctant to adopt new behaviours if they imply perceived costs in terms of extra time, uncertainties or effort to move beyond their comfort zones (Peattie, 2001; Diekmann and Preisendörfer, 2003), especially in the context of energy conservation behaviours (Yang et al., 2015; Nie et al., 2019). Since individuals can be regarded as essentially selfish (White and Peloza, 2009; Fisher et al., 2008; Green and Peloza, 2014) and rational (Frederiks et al., 2015), when they evaluate the costs and benefits of the modified behaviour before deciding to perform it, self-benefit appeals (SBAs) are a commonly accepted way of encouraging pro-environmental behaviours as they influence consumers’ goals and standards (White and Simpson, 2013; Diekmann and Preisendörfer, 2003; Tih et al., 2016). The influence of SBAs in the context of pro-environmental behaviour has been investigated in several contexts, including the energy industry (for examples regarding energy conservation behaviours, see Allen (1982) and Nolan et al. (2008)). In most cases, it is recommended for SBAs evocate cost savings (for an example in the automotive industry, see Shang and Peloza (2016)). Similarly, it is recommended that SBAs in the energy sector evocate the cost savings associated with the adoption of an energy efficient technology (Gadenne et al., 2011). Despite that, to the best of our knowledge, the effects of SBAs on ESBs and EETs, as different categories of energy conservation behaviours, have not been compared in a single setting. Thus, we propose the following hypothesis:

H3a. Self-benefit appeals (SBAs) increase consumers’ intentions both to implement energy saving behaviours (ESBs) and invest in energy efficient technologies (EETs). Regarding the determinants of consumers’ energy conservation behaviours within the Theory of Planned Behaviour, previous studies provide only limited insights into the relative effects of SBAs on SNs, PBC and ATB. Nolan et al. (2008) suggested that the influence of others’ judgements (i.e. SNs) on a behavioural option regarding energy conservation prevails over the individual attitude towards energy conservation (i.e. ATB), particularly when reinforced with the provision of costs saving information. Allen (1982), however, argued that SBAs influence self-perceptions of the ability to change behaviour (i.e. PBC) more than ATB. Consequently, we can hypothesise that:

H3b. Self-benefit appeals (SBAs) influence consumers’ intention

determinants and have more effect on subjective norms (SNs) and perceived behavioural control (PBC) than on attitude towards the behaviour (ATB).

2.3.2. Methods aiming to produce long-term effects on energy conservation: exposure to information

Exposure to information has been studied extensively in the advertising literature, especially with reference to the effects that a long-term exposure to general information on a certain topic has on consumers’ intentions and, subsequently, their behaviour (Malaviya, 2007; Manchanda et al., 2006; Wang et al., 2013; Huang and Huh, 2018). The stratification of information over time can help build long-term relationships with consumers and provide a solid and enduring image (Braun-LaTour and LaTour, 2004; Huang and Huh, 2018; Schmidt and Eisend, 2015). Huang and Huh (2018) argued that such repeated exposures stimulate individuals’ cognition and allow for a more accurate representation of an object in their mind. Corbett (2002) found that repeated information from the government had a direct influence on the intention to participate in riparian improvement programs. Witzling et al. (2015) analysed long-term exposure to information for pro-environmental behaviours from the perspective of Theory of Planned Behaviour, and confirmed its positive influence on the determinants of consumers’ intentions to prevent the spreading of invasive aquatic species. Similarly, Trumbo and O’Keefe (2001) argued that exposure to information is a predictor of ATB and SNs, which in turn predict the intention to conserve water. However, little is known about the comparative effects long-term exposure to information has on energy conservation behaviour. We thus hypothesise that:

H4a. Long-term exposure to general information about energy conservation positively influences the intention to implement energy saving behaviours (ESBs) and invest in energy efficient technologies (EETs).

H4b. Long-term exposure to general information about energy conservation positively influences consumers’ intention determinants and has more effect on subjective norms (SNs) and perceived behavioural control (PBC) than on attitude towards the behaviour (ATB).

3. Methods

3.1. Design, sample and data collection

To test our hypotheses, we investigated two categories of energy conservation behaviour (EETs and ESBs) using a survey of householders in Tuscany, Italy.

In terms of EETs, we focused on solar thermal panels (SPs) and

ground source heat pumps (GSHPs), which are associated with very different levels of exposure to information because of their different level of adoption at the household level. This choice allowed us to compare the influence of SBAs on the intention to adopt these respective technologies, and consequently the influence of the familiarity with the technology. SPs have been widespread, established and familiar in Italy for several years (the installed capacity increased by 428 TJ between 2015 and 2016), with a total production of 8.383 TJ at the national level (GSE, 2018). Conversely, GSHPs are a less widespread and less familiar technology in Italy (the installed capacity increased by approximately 1 TJ between the same years), with a total production of 77 TJ at the national level (GSE, 2018).

In terms of ESBs, we focused on behaviours that relate to everyday reductions in the energy used in houses (Barr et al., 2005), which are widespread among consumers due to their practicability and ease, and are encouraged not only through consumer rationality but also by awareness-raising campaigns about energy efficiency both at local and national levels (ENEA, 2017).

Primary data were collected through an on-line questionnaire survey administered to consumers between December 2016 and April 2017 in the metropolitan area of Pisa. In terms of the national landscape, Pisa has average levels of energy conservation initiatives and of SPs and GSHPs diffusion. The questionnaires were completed online to standardize exposure to the SBAs and ensure a neutral situation with no external sources of information that could influence the cognition process (Green and Pelozo, 2014; Tih et al., 2016; White and Simpson, 2013). Each respondent was randomly selected from the local population using an official dataset of households. They were engaged through a neutral approach by professionals and invited to visit the survey website. They were first contacted by telephone to guarantee the respondents anonymity and to explain the scientific objectives of the study. This direct contact enabled us to consider any ethical concerns arising from the use of Web 2.0 services, to increase the consumers' commitment to provide useful answers, and to control the sample-building process and thus avoid self-selection bias (Buchanan and Hvizdak, 2009).

We used a pre-test to measure the average completion time, and then informed the respondents that the survey would require around 15 minutes of their time. As this would depend on the respondents' cognitive effort (Holdershaw et al., 2018), we dropped those respondents that needed abnormal amount of time (either too much or too little). After the empirical observation of some survey completions, we used as cut-offs 30 minutes (as this reasonably revealed that respondents are distracted by external factors) and 11 minutes (which was the minimum time registered in the testing phase by respondents in conditions that were favourable for their concentration and mental focus).

The final sample consisted of 450 respondents. Each SBA, i.e. related to intention to implement energy-saving behaviours (IESBs), intention to invest in ground-source heat pumps (IGSHPs), and intention to invest in solar thermal panels (ISPs), was randomly assigned to respondents, which allowed us to obtain three treated groups with homogeneous characteristics in terms of age (average classes ranging between 3.38 and 3.41), gender (average classes ranging between 1.51 and 1.56) and education (average classes ranging between 3.28 and 3.41). Homogeneity in composition among groups was a necessary condition to assume that the variations of the outcome variables depended only on the different experimental manipulations. The sample included 208 men (46% of the total respondents) and 242 women (54%), thus providing a gender ratio in line with the Italian government's statistics (Istat, 2017). Four age groups were considered to control for age: 21–35; 36–50; 51–65; and >65. Those under 20 years old or over 80 were not considered, as they represent groups with little

competence or interest in investing in EETs. We targeted individuals who were either home owners or had electricity bills in their names. This ensured the relevance of respondents in our assessment of an individual's intention to conserve energy.

3.2. Measures

The questionnaire consisted of 28 questions separated into five sections: 1) participants' demographic information (control variables), i.e., gender, age, level of study, and family components; 2) measures of the exposure to energy conservation information as perceived by consumers; 3) administration of the SBAs; 4) measures of the constructs in the Theory of Planned Behaviour, i.e., ATB, SNs and PBC; and 5) measures of the three specific intentions, i.e. IESBs, ISPs, and IGSHPs.

The constructs, questions, and references are reported in Appendix A.

Each construct of the Theory of Planned Behaviour was measured through four items, which were adapted from the literature (Ajzen, 2002; Abrahamse and Steg, 2009; Masud et al., 2016; Chen, 2016). A five-point scale from 1 to 5 was used. The scale body of the text for the different expressions changed depending on the question posed, with 1 as the lowest value and 5 the highest.

The general intention to conserve energy was extracted as a latent variable and not directly measured, as it represents a broad concept and can thus cause difficulties and misunderstandings. These could lead, consciously or unconsciously, to misrepresentations of our respondents' real intentions and to additional cognitive effort that could alter the validity of the answers (Holdershaw et al., 2018).

The three intentions, i.e., IESBs, ISP, and IGSHP, were measured using three items adapted from Ajzen (2002) and Masud et al. (2016).

To ensure the content validity of the measurement model, we referred to previous studies and also conducted a pre-test with 25 people, including consumer behaviour experts from the energy sector. We thus revealed any possible weaknesses and misunderstandings that could affect the data collection. We avoided using ambiguous or unfamiliar terms, vague concepts or complicated syntax in the questions, to ensure they were simple, specific and concise (Podsakoff et al., 2003). Inverted evaluation scales and negative sentences were also included to reduce errors related to the answer patterns. Social desirability is a common source of bias that can influence the validity of experiment and survey findings, so the anonymity of the respondents and confidentiality was guaranteed, and they were asked to respond as truthfully as possible. We also stressed that there were no specific right or wrong answers.

3.2.1. Self-benefit appeals (SBAs)

Contextual information has been found to facilitate the semantic processing of a presented product (Shapiro, 1999), so to give context to the SBAs a brief definition of ESBs, SPs and GSHPs was initially given.

The definitions of the technologies and the content of the SBAs are reported in Appendix B.

For each SBA, a detailed description of the specific benefits of each energy conservation alternative was provided before the measurement of the determinants of the Theory of Planned Behaviour (Green and Pelozo, 2014), namely SBA-ESBs, SBA-SPs or SBA-GSHPs. This allowed us to check for the direct influence of each SBA on IESBs, ISPs and IGSHPs.

Each SBA consisted of two parts. The first included the object of the self-benefit appeal, which varied among ESBs, SPs and GSHPs, and the second provided two estimations of the benefits associated

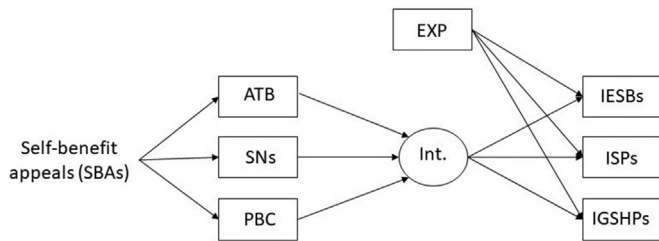


Fig. 1. The first model showing the relationship between SBAs, intention determinants, EXP, the latent general intention and the measured specific intentions. (ATB = Attitude towards the behaviours; SNs = Subjective norms; PBC = Perceived behavioural control; (I)ESBs = (Intention to implement) energy saving behaviours; (I)SPs = (Intention to invest in) solar thermal panels; (I)GSHPs = (Intention to invest in) ground source heat pumps; EXP = exposure to information; Int = general intention to conserve energy).

with the implementation of the ESBs or the investment in EETs, which were kept the same for all of the SBAs. The first estimation was the expected average percentage of the energy cost reduction derived from the energy conservation behaviour, which is a frequently applied benefit for SBAs (Nolan et al., 2008; Allen, 1982; Shang and Peloza, 2016; Peloza and Shang, 2011; Peattie, 2001). The second estimation was the expected investment payback period. Both estimations were plausible as they were in line with the average performance reported by the Italian Energy Authority (AEEGESI, 2016) and the Italian agency responsible for new technologies, energy and the environment (ENEA, 2016). By keeping the estimations the same in all the three SBAs, any bias concerning the performance of the specific alternative could be avoided, thus focusing the analysis only on (the effects of) the nature of the investigated energy conservation behaviour.

3.2.2. Exposure to information

Unlike the provision of SBAs, the role played by repeated exposure to information was assessed using a scale that captured the perceived frequency of the exposure to general information about energy conservation (i.e., the number of captured messages in the last year), without any specific reference to ESBs, SPs or GSHPs. When faced with repeated information over a prolonged period of time, consumers may become confused about the specific characteristics of the information, and thus the sole association with the main theme is strengthened (Braun-LaTour and LaTour, 2004). By drawing on previous literature (Witzling et al., 2015; Corbett, 2002) we modified the exposure to information score to consider the three main exposure alternatives in Italy: mass media; energy providers; and family and friends (see Appendix A).

3.3. Empirical model

Two models were built to test our hypotheses (Table 1). Fig. 1 shows the first, a structural equation model, in which after the elaboration of the SBAs the attitude towards the behaviour (ATB), subjective norms (SNs) and perceived behavioural control (PBC) were used as predictors of the latent construct Intention, representing the general intention to conserve energy. Both intention and exposure to information were used as predictors of IESBs, ISPs and IGSHPs.

The second model is aimed at evaluating the influence of exposure to information on ATB, SNs and PBC across the three SBAs through a multivariate analysis of variance (MANOVA) (Fig. 2).

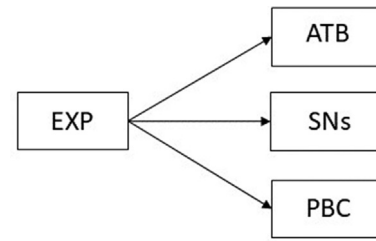


Fig. 2. The second model, with EXP as the background variable of the intention determinants. (EXP = exposure to information; ATB = Attitude towards the behaviours; SNs = Subjective norms; PBC = Perceived behavioural control).

4. Results

Table 2 provides the Cronbach's alpha scores for each construct of the measurement model, which were all above the recommended threshold of 0.6. Convergent and discriminant validity was analysed through a factor analysis, and the construct validity of the measures was supported.

The overall fit scores of the full structural equation model used to test hypotheses H1, H2, H3-a, H3-b and H4-a are reported in Table 3. They were all acceptable according to the threshold values recommended in the literature: RMSEA < 0.08; CFI > 0.95; TLI > 0.91 (Beauducel and Wittmann, 2005; MacCallum et al., 1996; Hu and Bentler, 1999).

The results show that ATB, SNs and PBC positively influenced consumers' general intention to conserve energy, supporting H1 (Table 4). The control variables such as age and level of education influenced consumers' general intention to conserve energy when considering all the three SBAs (i.e. SBA-ESBs, SBA-SPs, and SBA-GSHPs). In particular, younger people (β -ESBs = -0.28 , $p < 0.01$; β -SPs = -0.24 , $p < 0.01$; β -GSHPs = -0.12 , $p < 0.05$) and respondents with high education levels (β -ESBs = 0.35 , $p < 0.01$; β -SPs = 0.19 , $p < 0.05$; β -GSHPs = 0.032 , $p < 0.05$) were more likely to have a general intention to conserve energy. In addition, in line with H2, the general intention to conserve energy had a significant and positive relationship with the three specific intentions of IESBs, ISPs, and IGSHPs. These results did not vary across the three SBAs (i.e., SBA-ESBs, SBA-SPs and SBA-GSHPs).

Interestingly, SBA-ESBs and SBA-SPs were positively related to IESBs and ISPs, while the effect on IGSHPs was not higher with SBA-GSHPs than with SBA-SPs. Thus, H3-a was not fully supported, as only SBAs related to familiar energy conservation behaviours had a positive influence on ESBs and EETs.

Conversely, H3-b was supported because, regardless of the SBAs, SNs and PBC had a stronger and positive relationship with general intention than ATB. In particular, the relationship between ATB and the general intention was higher with ESBs than with EETs, but significantly weaker than those of SNs and PBC. SNs had by far the strongest influence on general intention across all the SBAs, followed by PBC, but while the influence of PBC decreased. This suggests that SNs should be considered as the main driver of energy conservation intentions, but the more common the promoted energy conservation behaviour is, the more PBC complements SNs.

Finally, exposure to general information about energy conservation only significantly and positively influenced the intention to implement ESBs and invest in SPs in the case of SBA-SPs. Thus, H4-a was not supported as it involved the influence of exposure to information that was not activated by SBA-ESBs and SBA-GSHPs. However, exposure to information positively influenced all the determinants of the variables in the Theory of Planned Behaviour

Table 2
Constructs, Factor loadings (λ) Cronbach's alpha (α) based on the different SBAs provided (Source: authors).

Construct	SBA-ESBs			SBA-SPs			SBA-GSHPs		
	λ	α		λ	α		λ	α	
Attitude towards the behaviours (ATB)	ATB-ESB1	0.511	0.720	ATB-SP1	0.543	0.660	ATB-GSHP1	0.597	0.615
	ATB-ESB2	0.766		ATB-SP2	0.708		ATB-GSHP2	0.608	
	ATB-ESB3	0.802		ATB-SP3	0.775		ATB-GSHP3	0.721	
	ATB-ESB4	0.515		ATB-SP4	0.592		ATB-GSHP4	0.637	
Subjective norms (SNs)	SN-ESB1	0.660	0.647	SN-SP1	0.585	0.633	SN-GSHP1	0.563	0.678
	SN-ESB2	0.589		SN-SP2	0.519		SN-GSHP2	0.605	
	SN-ESB3	0.513		SN-SP3	0.590		SN-GSHP3	0.620	
	SN-ESB4	0.501		SN-SP4	0.542		SN-GSHP4	0.581	
Perceived behavioural control (PBC)	PBC-ESB1	0.504	0.619	PBC-SP1	0.565	0.645	PBC-GSHP1	0.537	0.683
	PBC-ESB2	0.610		PBC-SP2	0.535		PBC-GSHP2	0.513	
	PBC-ESB3	0.582		PBC-SP3	0.598		PBC-GSHP3	0.575	
	PBC-ESB4	0.517		PBC-SP4	0.557		PBC-GSHP4	0.665	
Intention to implement energy saving behaviours (IESBs)	IESB-ESB1	0.612	0.658	IESB-SP1	0.641	0.620	IESB-GSHP1	0.609	0.683
	IESB-ESB2	0.602		IESB-SP2	0.643		IESB-GSHP2	0.662	
	IESB-ESB3	0.520		IESB-SP3	0.512		IESB-GSHP3	0.568	
Intention to invest in solar thermal panels (ISPs)	ISP-ESB1	0.614	0.604	ISP-SP1	0.613	0.683	ISP-GSHP1	0.671	0.616
	ISP-ESB2	0.556		ISP-SP2	0.616		ISP-GSHP2	0.569	
	ISP-ESB3	0.506		ISP-SP3	0.574		ISP-GSHP3	0.620	
Intention to invest in ground source heat pumps (IGSHPs)	IGSHP-ESB1	0.623	0.644	IGSHP-SP1	0.690	0.667	IGSHP-GSHP1	0.603	0.611
	IGSHP-ESB2	0.501		IGSHP-SP2	0.581		IGSHP-GSHP2	0.667	
	IGSHP-ESB3	0.582		IGSHP-SP3	0.628		IGSHP-GSHP3	0.581	

(ATB = Attitude towards the behaviours; SNs = Subjective norms; PBC = Perceived behavioural control; (I)ESBs = (Intention to implement) energy saving behaviours; (I)SPs = (Intention to invest in) solar thermal panels; (I)GSHPs = (Intention to invest in) ground source heat pumps; SBA = self-benefit appeal).

Table 3
RMSEA, CFI e TLI, based on the different SBAs provided (Source: authors).

Fit measures	SBA-ESBs	SBA-SPs	SBA-GSHPs
RMSEA	0.079	0.061	0.079
CFI	0.951	0.986	0.961
TLI	0.912	0.965	0.913

(RMSEA = Root Mean Square Error of Approximation; CFI = comparative fit index; TLI = Tucker–Lewis index; SBA = self-benefit appeal; ESBs = energy saving behaviours; SPs = solar thermal panels; GSHPs = ground source heat pumps).

(see model in Fig. 2), which supported H4-b and revealed the indirect mechanism that connected it to energy conversation intentions. Notably, all the forms of exposure had a positive and significant influence on the predictors of the Theory of Planned Behaviour (p -value <0.05), regardless of the appeal provided.

Table 4
Coefficients based on the different appeal provided [$*p < 0.05$ e $**p < 0.01$] (Source: authors).

Constructs	SBA-ESBs		SBA-SPs		SBA-GSHPs	
	Coefficients	S.E.	Coefficients	S.E.	Coefficients	S.E.
IESBs ←						
Int.	.891875**	.0455922	.7538177**	.0468838	.8588676**	.0492034
EXP	.0989324	.0649911	.1830628**	.069308	.0322072	.0687974
cons	-.3331141	.2421249	-.7055272	.2754018	-.1148107	.2729718
ISPs ←						
Int.	.6877312**	.0593621	.8137867**	.0423703	.6338859**	.0630493
EXP	-.0475995	.0750465	.1580737*	.0684998	-.0354258	.0762748
cons	.1760928	.2797067	-.6085671	.272016	.1333338	.302816
IGSHPs ←						
Int.	.5545506**	.0708953	.71265**	.0500533	.6546063**	.0619896
EXP	.0725313	.0772691	.10378	.0731785	.0519296	.0748352
cons	-.2770536	.2881265	-.3775857	.2905719	-.2205251	.2970873
Int. ←						
ATB	.2862288**	.0692077	.1890158*	.075243	.1901088**	.0712955
SNs	.4175658**	.074954	.4811024**	.0679077	.5572659**	.063204
PBC	.3043061**	.0716553	.2316817**	.073375	.1951952*	.0765622

(ATB = Attitude towards the behaviours; SNs = Subjective norms; PBC = Perceived behavioural control; Int = general intention to conserve energy; (I)ESBs = (Intention to implement) energy saving behaviours; (I)SPs = (Intention to invest in) solar thermal panels; (I)GSHPs = (Intention to invest in) ground source heat pumps; EXP = exposure to information; SBA = self-benefit appeal).

5. Discussion

Our results provide novel insights into how self-benefit appeals influence pro-environmental behaviours and, in particular, two categories of energy conservation behaviours: ESBs implementation and investments in EETs. The positive relationship between the general intention to conserve energy and specific intentions to implement ESBs and invest in EETs extends previous studies (Ajzen et al., 2011; Nie et al., 2019) by confirming that all specific intentions are based on general intention, which suggests a degree of synergy between different energy conservation behaviours.

When focusing on communication methods with a short-term orientation, it is partially confirmed that SBAs are an effective tool for influencing consumers' intentions and, subsequently, their behaviours in the energy conservation setting. Although SBAs have been found to be effective incentives for pro-environmental

behaviours (Peattie, 2001; Green and Pelozo, 2014; White and Simpson, 2013; Yang et al., 2015; Stern, 2000), our research highlights that these are behaviour-specific, particularly when considering the different roles of general and specific intentions, although these are linked conceptually. As previously noted (Allen, 1982; Nolan et al., 2008), SBA-ESBs and SBA-SPs increased IESBs and ISPs, respectively, but we found that SBA-GSHPs mainly increased IESBs and not IGSHPs. Thus, with less well-known technologies (e.g., GSHPs), consumers may implicitly perceive barriers that discourage positive mental states and inclinations. The rationality and self-interest of consumers may then lead them to opt for easier behaviour, such as implementing ESBs, which is equally legitimate in terms of outcomes but easier to implement.

This explanation is additionally supported by examining the determinants of the Theory of Planned Behaviour. The perceived ease of performing the behaviour, i.e. PBC, decreases from ESBs to GSHPs. Thus, in the case of a less well-known technology (GSHPs), consumers are more likely to exhibit behaviour they consider easier and cheaper by “plucking the low-hanging fruit”. These findings are also true for SPs when compared to ESBs.

Thus, SBAs emerge as more effective for changing daily routines than for prompting investment in hard technologies, particularly for those that are less well-known. These findings contribute both to the literature on technology diffusion and the factors influencing the effectiveness of advertising appeals. When companies advertise energy-efficient technologies, they should consider the extent to which consumers perceive them as an option and not a necessity. Although a new technology can benefit from it simply being a novelty (for EETs that can be perceived as “good” just for being “new”, see Sidiras and Koukios (2004)), advertising strategies should find solutions to overcome familiarity related barriers.

By focusing on the determinants of the intention in the Theory of Planned Behaviour, we find that our results confirm that SNs and PBC have a stronger influence than ATB on the general intention with all the SBAs, which is in line with previous research (Nolan et al., 2008; Allen, 1982). Thus, the perceptions of others' points of view and the perceived ease of performing the behaviour are always more important than the individual's evaluation of the favourability of the behaviour itself. These findings extend the knowledge regarding energy conservation behaviours by revealing that when people have to change their energy-wasteful behaviour or invest in EETs, the hierarchy among the determinants of intention does not vary. This underlines the importance of the relationships and the characteristics of the surrounding environment in which consumers live and behave: the more they feel surrounded by people who care about energy conservation and share similar behaviours, the more they will be prone to behave in an energy careful way. This is particularly true for less well-known technologies, for which SNs are by far the most relevant driver of consumer intention. When consumers consider a less familiar technology, they tend to strongly rely on others' approval (or disapproval) when investing. Ease and familiarity are also found to be important in understanding what drives a specific behaviour for the second strongest driver of the general intention, PBC, thus counterbalancing the decrease of SNs for well-known technologies. ESBs advertising, which represents easier and cheaper behaviours than investment in either EETs, could thus usefully leverage these characteristics. The same applies for SPs if compared to GSHPs, as they represent a technology that consumers can easily recognise and recall from their daily interactions. Instead, since ATB is much lower than PBC for EETs than for ESBs, our results provided no evidence that promoting positive attitudes towards everyday energy saving behaviours and, even more, towards the adoption of EETs should be the sole priority for companies that aim to increase consumers' behavioural intentions.

Regarding communication methods with a long-term orientation, repeated exposure to general information about energy conservation is not always a determinant of consumers' specific intentions, as previous research has found (Witzling et al., 2015; Trumbo and O'Keefe, 2001). However, our results show that exposure to information has some influence on IESBs and ISPs in the case of SBA-SPs, which suggests the possibility of recalling information that consumers have repeatedly elaborated strengthens the effects on intentions. The more easily recognisable and familiar the technology in the SBA is, the more likely it is that past information on energy conservation will be recalled and will influence consumers' intentions. This finding extends the “affective transfer hypothesis” introduced by Nuttin and Greenwald (1968) to SBAs in the context of energy conservation by suggesting that repeated exposure to information can play a role in determining consumers' intentions only when advertising focuses on easily recognisable and familiar technologies, and thus the possibility of exploiting the halo effect a familiar technology can have on an unfamiliar technology is ruled out.

Our results also confirm another important mechanism of the influence of exposure to information on specific intentions through the general intention to conserve energy. As Witzling et al. (2015) and Trumbo and O'Keefe (2001) found, repeated exposure to general information can modify consumers' informational foundations and thus act as a background variable of ATB, SNs and PBC. Beliefs, as Ajzen et al. (2011) suggested, can exert an indirect influence on intentions and behaviours regardless of the SBA used, even if they are incorrect or biased. The influence that the stratification of information campaigns has on beliefs regarding energy conservation behaviours can thus be leveraged through communication strategies that combine methods with long-term and short-term orientations, with the aim of influencing specific intentions and behaviours.

6. Conclusions

In this study, the effects of communication methods with short and long-term orientations on consumers' intention to perform specific pro-environmental behaviours have been examined, namely energy conservation behaviours consisting of implementing ESBs and investing in EETs.

Communication strategies based on a long-term stratification of general information on energy conservation are not directly effective in changing daily energy wasteful routines or in encouraging investment in energy efficient technologies, but when they are combined with short-term orientation methods like advertising focused on well-known technologies, they become relevant as they positively influence the intention to implement energy saving behaviours and to invest in such technologies. The theoretical implication is that the “affective transfer hypothesis” (Nuttin and Greenwald, 1968) can be extended to the energy conservation context, and the integration of short- and long-term communication strategies can be viewed as an immediate way of activating information that consumers have been repeatedly exposed to, thus influencing intentions more effectively. In other words, repeated exposure to general information on energy conservation can be used to influence consumers' informational basis, which is a precondition for the successful implementation of self-benefit appeals, rather than a solution for influencing consumers' intention *per se*. A strategic harmonization of methods should thus be at the basis of any communicational strategic approach, particularly for companies that are seeking new business opportunities by changing consumers' behavioural patterns.

Unfortunately, the above-mentioned activation is not possible when consumers cannot easily recognise the targeted technology,

which means that is not possible to extend the affective transfer hypothesis to newer or unknown technologies. For these technologies, the findings related to the determinants of the Theory of Planned Behaviour suggest that the harmonization should be directed towards creating a consumer informational basis that can increase social acceptability and the perceived ease of implementing the different ESBs and EETs.

In terms of managerial implications, companies thus should first have clear ideas about the behaviour they wish to promote so as to differentiate their communication strategies according to the energy conservation behaviours they are targeting. Second, they should conduct analyses to assess the levels of information consumers have been exposed to, according to the energy conservation behaviour considered. Finally, they should ensure that the information already received by consumers is in line with their short-term strategies, thus activating the most effective path to increasing general and specific intentions to perform the targeted behaviour.

Our results can prompt companies to use self-benefit appeals to develop communication strategies aimed at changing daily energy wasteful routines and promoting investment in highly diffused technologies, but suggests that they should be cautious when using the same strategies for targeting the adoption of less well-known technologies. To promote these technologies, companies should follow a different sequence of actions. First, they should stress the social acceptability of the new (less known) technology. An effective method could be to trigger among consumers a “word-of-mouth” mechanism to move from diffidence to engagement. In fact, communicating that the technology is accepted and used by other consumers can increase the possibility both of communicating other rational benefits and leveraging the associations with energy conservation. Second, technology providers should reduce the perception that adopting the new technology is difficult by using communication campaigns that report its ease of use when compared to traditional alternatives. Finally, companies should emphasize the convenience of investing in the new technology in terms of self-benefits, thus making consumers more favourable when evaluating the behaviour itself in the short-term.

As in any experiment-based research, it is important to recognize the limitations of this study. First, data were gathered from a single metropolitan area in Italy. Although the research design and data collection conformed with current scientific standards, the interpretation of results and their generalization should take this geographical constraint into consideration. Similar investigations can be conducted in other regions, to gain a better understanding of the effect of cultural and socio-economic variables.

Second, we considered a specific range of consumer behaviours: the implementation of ESBs and the investment in EETs. Future studies can usefully consider other pro-environmental behaviours (and related intentions) to further generalize the proposed conceptual model.

Third, we assumed that consumers had different levels of recognizability and awareness of ESBs and EETs. In particular, we assumed decreasing levels when moving from ESBs to SPs and from SPs to GSHPs. This concept can be explicitly measured in future studies due to its importance, thus better representing how it is really perceived by each respondent.

Fourth, it was impossible to evaluate consumers' actual behaviour, due to the particular energy conservation behaviours chosen. Future studies should address this by performing a longitudinal instead of a cross-sectional study.

Finally, when analysing actual behaviours, our conceptual model can be extended by measuring, for example, the potential moderating effect of a specific intention on the relation between general intention and actual behaviour, and the potential direct

effect of general intention on actual behaviour.

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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.

CRediT authorship contribution statement

Francesco Rizzi: Conceptualization, Methodology, Formal analysis, Writing - original draft, Writing - review & editing, Supervision, Project administration, Funding acquisition. **Eleonora Annunziata:** Conceptualization, Methodology, Formal analysis, Writing - original draft, Writing - review & editing, Supervision, Project administration, Funding acquisition. **Michele Contini:** Conceptualization, Investigation, Formal analysis, Writing - original draft. **Marco Frey:** Supervision, Funding acquisition.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.jclepro.2020.122039>.

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