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Motivation and pro-environmental behaviours: where to target efforts for persistent conducts? A field and an online experiment.

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ABSTRACT

This thesis seeks to develop practical methods to influence individuals' decision-making towards environmental lifestyles and choices, in order to mitigate negative changes in natural ecosystems caused by human activities. Environmental psychology and behavioural economics provide relevant insights to this research topic, as they encompass the complexity of decisional processes and the importance of moral considerations for pro-environmental conducts. Stemming from these disciplines, in this work two empirical contributions were designed to investigate the relative importance of moral motivations and of social influence when deciding to act environmentally-friendly. Firstly, in the context of a large-scale project based on social influence to reduce Italian households' energy consumption, a survey was developed to explore the impact of the prolonged exposure to normative information on behaviours, as well as on environmental disposition. Secondly, an online experiment was designed to test a new intervention based on the integration of social influence and self-identity manipulation, with the aim of maximising the number of individuals displaying pro-environmental conducts. A common thread of the work consists in the importance of the environmental disposition, mainly in the form of personal norms, as direct determinant of environmental behaviours, and how such norms alter the effectiveness of interventions based on social influence. The two studies showed consistent patterns of results, and provided some advancements to existing literature. Both demonstrated the importance of personal norms as determinant in the decision to act environmentally-friendly. Further, it was observed that the prolonged exposure to social influence led to its introjection, with a subsequent strengthening of personal norms. Beyond this positive impact on the environmental disposition, normative information influenced behaviours towards the relevant outcome. In the online experiment, this effect was stronger than the impact exerted by self-identity manipulation, confirming that social influence provides an appeal also for those individuals who might not have any other motivation to behave pro-environmentally. Notwithstanding, it was not possible to determine the interactions between the presence of personal norms and the influence of normative information. Finally, an unexpected result of the online experiment was that self-identity manipulation resulted in lower level of pro-environmental behaviours

compared to the control group: self-identity was actually strengthened by the treatment, but this result was not enough to prevent negative spillover effects. Findings of the work have relevant practical implications, as they provide insights on which elements should be prioritized and targeted to promote pro-environmental outcomes. A main result of this work underlines the importance of personal norms as central determinant of behaviour; hence, environmental campaigns should create or strengthen personal norms either by means of prolonged exposure to social influence or by raising environmental values and concern. Finally, due to the mixed evidence in terms of self-identity manipulation, practitioners are suggested to avoid such type of intervention, unless innovative approaches for the prevention of undesired effects are available.

ABSTRACT

Questa tesi mira a sviluppare metodi pratici che influenzino il processo decisionale delle persone verso stili di vita sostenibili, al fine di mitigare i danni provocati dalle attività antropiche sugli ecosistemi naturali. La psicologia ambientale e l'economia comportamentale contribuiscono in maniera innovativa a questo filone di ricerca, in quanto tengono conto della complessità dei processi decisionali e dell'importanza della dimensione morale nella scelta di agire a favore dell'ambiente. Sulla base di queste discipline, nel presente lavoro sono stati sviluppati due studi empirici che indagano l'importanza delle motivazioni morali e dell'influenza sociale, e della loro interazione, nella decisione di agire in modo ecologico. Il primo studio fa parte di un progetto condotto su larga scala allo scopo di ridurre il consumo energetico delle famiglie italiane, attraverso meccanismi di influenza sociale; in questo contesto è stato sviluppato un questionario al fine di analizzare l'impatto dell'esposizione prolungata all'influenza sociale sui comportamenti e sull'attitudine ambientale. In secondo luogo, è stato progettato un esperimento online per testare un nuovo intervento basato sull'integrazione dell'influenza sociale e della manipolazione dell'identità ambientale, al fine di massimizzare il numero di individui che attuano comportamenti pro-ambientali. Il filo comune dei due lavori consiste nella valutazione dell'importanza dell'attitudine ambientale, soprattutto in forma di norme personali, come fattore decisivo del comportamento, e dell'effetto della presenza di tali norme sull'efficacia degli interventi basati sull'influenza sociale. I due studi hanno riportato risultati coerenti, contribuendo alla letteratura esistente. Entrambi gli interventi hanno dimostrato l'importanza delle norme personali come fattore determinante nella decisione di agire a favore dell'ambiente. Inoltre, la prolungata esposizione all'influenza sociale ha portato alla sua interiorizzazione, con un conseguente rafforzamento delle norme personali. Si è anche osservato che l'esposizione all'influenza sociale ha spinto gli individui verso la scelta desiderata. Nell'esperimento online, questo effetto è stato più forte dell'impatto esercitato dalla manipolazione dell'identità, confermando che l'influenza sociale offre una motivazione anche per quegli individui che potrebbero non avere alcun altro motivo per comportarsi in maniera pro-ambientale. Tuttavia, non è stato possibile determinare le interazioni tra la presenza di norme personali e l'impatto dell'influenza

sociale. Infine, l’esperimento online ha portato a un risultato inaspettato: la manipolazione dell’identità ha portato a un livello più basso di comportamenti pro-ambientali rispetto al gruppo di controllo; l'identità è stata effettivamente rafforzata dal trattamento, ma questo non è stato sufficiente a prevenire effetti negativi di spillover. I risultati del lavoro hanno implicazioni pratiche rilevanti, in quanto forniscono indicazioni su quali elementi fare leva per promuovere atteggiamenti ecologici; infatti questo lavoro ha dimostrato l'importanza delle norme personali come fattore determinante del comportamento. Di conseguenza, le politiche ambientali dovrebbero creare o rafforzare le norme personali, sia attraverso una prolungata esposizione all'influenza sociale, sia rinforzando i valori e la consapevolezza ambientale. Infine, i risultati contradditori ottenuti con la manipolazione dell’identità ambientale, suggeriscono di non applicare tale intervento a meno che non siano disponibili approcci innovativi per la prevenzione degli effetti indesiderati.

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EXECUTIVE SUMMARY

Anthropogenic environmental exploitation and greenhouse gas emissions endanger the equilibrium and the survival of natural ecosystems. Significant and urgent actions are needed to prevent and reduce long-lasting and irreversible negative effects. Among policies and mitigation strategies that tackle the causes of environmental issues, changes in individuals' behaviours and attitude represent an important leverage. In fact, beside reducing their direct emissions, individuals can proactively contribute to the creation of a sustainable society, by being low-carbon consumers, low-carbon employees, and low-carbon citizens (Whitmarsh et al. 2009). The aim of this work is to contribute to the stream of research which seeks to develop practical methods to influence decision-making towards environmental lifestyles and choices, building on insights from behavioural economics and environmental psychology, so that leaders of public and private bodies could eventually design simple and effective campaigns that efficiently promote relevant outcomes. Hence, behavioural insights represent a powerful tool to design environmental policies and social marketing campaigns that directly manipulate individuals' behaviours and, simultaneously, seek to increase the public acceptance of environmental policies.

Traditional persuasive interventions assume that individuals are mere rational and wealth-maximising actors (Henry 2012; Pollitt and Shaorshadze 2013; Weintraub 1993; Wilson and Dowlatabadi 2007); thus, they are based on the provision of environmental information, and on the supply of personal economic benefits (Bolderdijk et al. 2013; Evans et al. 2013; Frederiks et al. 2015). On the contrary, psychological and behavioural economics studies demonstrate that there is a broad set of elements affecting decisional processes, such as individuals' willingness to comply with own moral self-concept and with common rules of behaviours (Thøgersen 2006). Given the complexity of decision-making, environmental campaigns can appeal to different motivational drivers when fostering pro-environmental behaviours. These appeals are of paramount importance, as they affect individuals' willingness to consistently behave pro-environmentally over time and across different domains. Indeed, environmental campaigns may create spillover effects either aligned (positive) or adverse (negative) to policy goals, by influencing individuals' willingness to

engage in further behaviours beyond the one initially targeted (Thøgersen and Crompton 2009). While policies appealing to self-interested reasons, like economic incentives, inhibit positive spillover effects and facilitate the creation of negative ones, those targeting mainly environmental and moral reasons result in positive spillover (Truelove et al. 2014). Consequently, in order to attain overall positive results for environmental protection and conservation, policy makers should invest and prioritize those campaigns that ensure positive spillover effects. Bearing this objective in mind, there are some behavioural antecedents that can be targeted to effectively promote changes towards the desired outcome; on the one hand, the social nature of humans leads them to comply with social norms, which are informal governance mechanisms that dramatically influence decision-making and behaviours. Normative influence proved to be effective in a widespread set of domains, such as recycling (Schultz 1999), food waste prevention (Nomura et al. 2011), energy consumption reduction (Allcott 2011; Cialdini and Schultz 2004; Harries et al. 2013; Nolan et al. 2008; Schultz et al. 2007), sustainable lifestyles (Rettie et al. 2010), and household water usage reduction (Ferraro et al. 2011; Ferraro and Price 2013). On the other hand, there are mental models that reflect the shared understanding of a community and constitute part of individuals' beliefs and background. Environmental self-identity, defined as the extent to which persons see themselves as someone who perform pro-environmental behaviours (Van der Weff et al. 2014a), is one of these mental models. Laboratory experiments demonstrated that it is possible to strengthen self-identity by reminding individuals of their past pro-environmental behaviours (Cornelissen et al. 2008; Van der Werff et al. 2013a, 2014a, 2014b), and, hence, to activate environmental rules of conducts and promote consistent behaviours. The current work devotes special attention to the interaction between these behavioural antecedents and personal norms, defined as the feeling of moral obligation to engage in a specific behaviour (Schwartz 1977). Personal norms derive from two mechanisms that are not mutually exclusive, but rather complementary: they stem from the internalization and introjection of social norms, and, at the same time, they are the result of a deep and conscious reasoning about a behaviour's moral consequences (Thøgersen 2006, 2009).

Within this framework, the inception of the work originates in a thorough review of the scientific literature, which highlighted some relevant topics not investigated by extant studies. Specifically, it explores the connection between motivation based on moral and environmental considerations, and the decision to engage in different pro-environmental behaviours, characterised by different structural features. Further, it studies how such moral motivations interact with social influence. In this latter research topic, two main aspects are considered: firstly, whether the prolonged exposition to normative messages affects personal disposition and norms to behave pro-environmentally. Secondly, it is analysed how personal beliefs and norms already endorsed by the target affects the effectiveness of normative campaigns. Finally, the work tests the impact of a new potential intervention based on the integration of normative influence and self-identity manipulation. The idea derives from the appraisal that normative influence and environmental self-identity leverage on different motivational appeals; hence, by combining them, it is possible to increase the number of people engaging in pro-environmental behaviours. Indeed, while the former convinces also individuals who might not have any other reason to behave pro-environmentally (Nolan et al. 2008), the latter is likely to be more effective for those who already hold an environmental attitude (Thøgersen and Crompton 2009).

The analysis is realized by means of two empirical studies. Study 1 took place in the context of a large-scale campaign jointly proposed by two multinational companies in the Italian framework, aiming at reducing households' electricity consumption through normative influence. The design of this program rooted in the literature demonstrating the positive influence of normative interventions in encouraging households to save energy (Nolan et al. 2008; Schultz et al. 2007); nowadays, it is one of the most notable non-price program acting on energy consumption reduction, with significant results during the program, as well as for years after its completion (Allcott 2011; Allcott and Rogers 2014; Ayres et al. 2012; DNV-GL 2015). Within this project, a survey was developed and proposed to a representative sample of program participants, in order to collect data relevant to contribute to the research topics; the analysis was integrated with information about actual household behaviours provided by the companies. In Study 2, an online experiment was

developed to investigate the potential of the proposed environmental campaign. The experiment was implemented through the online platform Prolific Academy. The design was based on extant studies; indeed, both normative influence and self-identity manipulation are more likely to influence behaviours under a specific set of conditions, which have been taken into consideration to guarantee a significant effect of the treatments on the decision-making process. Besides, consistently with Study 1, it was explored how norms and beliefs already endorsed by the target alter the effectiveness of interventions based on normative influence.

The two studies revealed consistent results, and provided some advancements to contribute to the gaps identified. Firstly, in both interventions, it was observed the importance of personal norms as direct determinant in the decision to act environmentally-friendly; more importantly, this relation was positive and significant for behaviours characterised by different structural features: while Study 1 focused on electricity consumption, a "medium-to-high cost" behaviour (Kaiser and Schultz 2009), Study 2 focused on the donation to an environmental charity, a rather simple and low-cost action. Hence, although extant literature observed mixed evidence for behaviours entailing high situational and personal costs, findings of the current work are aligned with the stream of research that argues that attitudes are a stronger determinant of pro-environmental behaviour when situational constraints are powerful and demanding, and, thus, when effort is required (Black et al. 1985; Schultz and Oskamp 1996; Van der Werff and Steg 2015). Further, it was observed that individuals exposed to prolonged normative information displayed stronger personal norms: hence, Study 1, provides initial findings about the opportunity to encourage individuals to introject social expectations, by making them salient for a significant period of time. However, personal norms are more than this, as they derive from the environmental disposition and attitude too. Results verified this double origin, as both the perceived social pressure and the environmental background were significant predictor of personal norms, even when considered together. Then, regarding the effectiveness of normative influence on individuals' behaviours, this work provides further evidence of its impact: both studies demonstrated that, by increasing the salience of relevant others' standard conduct, individuals complied with it and acted more

pro-environmentally. Since outcomes of normative campaigns are not transferrable across countries (Fischer 2007) and given the absence of past studies like the one proposed by the two companies within the Italian framework, Study 1 provides promising initial results about the effectiveness of this type of campaigns, even in this specific national context. Moreover, it is worth highlighting that, in Study 2, consistently with past researches (Nolan et al. 2008; Schultz 1999), the influence of normative information was stronger than the impact of self-identity manipulation. Subsequently, also in the context of this work, social influence provided a persuasive appeal also for those individuals who might not have any other motivational driver. Notwithstanding, it was not possible to univocally determine the interactions between the presence of personal norms and the influence of normative information. Finally, in Study 2, not only normative influence significantly affected behaviours, but also self-identity manipulation. However, inversely to results achieved by past experiments (Cornelissen et al. 2008; Van der Werff et al. 2013a, 2014a, 2014b), in this study self-identity manipulation resulted in lower level of pro-environmental behaviours: self-identity was actually strengthened by the treatment, but this positive effect was not enough to prevent the occurrence of negative spillover effects. Thus, even though individuals successfully inferred their environmental attitude from their past pro-environmental behaviours, they did not act consistently with it. Contrary to expectations, the occurrence of the negative spillover did not allow to increase the level of pro-environmental behaviours; nonetheless, results are aligned with the stream of literature that detected negative results when trying to encourage new pro-environmental behaviours stemming from individuals' previous actions (Bolton et al. 2006; Clot et al. 2016; Tiefenback et al. 2013).

To conclude, the work has relevant practical implications, as it provides practitioners with insights on which elements should be prioritized and targeted to promote socially-relevant outcomes. A main result of this study underlines the importance of personal norms as direct determinant of behavioural decisions; hence, the goal of environmental campaigns would have higher chances to be achieved if such interventions successfully create or strengthen favourable personal norms. Therefore, on the one hand, it is recommended a wider adoption of normative programs, as they entail twofold benefits: not only they

influence behaviours when the relevant decision is made; but, above all, they strengthen personal norms, by inducing individuals to introject social expectations. On the other hand, policies can target environmental disposition and attitude to promote personal norms embedded and integrated in the moral self. Essential antecedents of the environmental disposition are environmental values, which are formed during childhood, as a result of the individual's needs, traits, experiences, socialization and culture (Bardi and Goodwin 2011); therefore, a main goal of policy interventions consists in raising environmental values, by acting on early stages of life, for instance through an education system that exposes children to the contact of nature (Beery and Wolf-Watz 2014; Brügger et al. 2011; Chawla and Cushing 2007; Ernst and Theimer 2011). Finally, due to the mixed evidence in terms of interventions that encourage new pro-environmental behaviours stemming from past actions, practitioners are suggested to avoid them unless innovative contributions for the prevention of undesired effects are available.

Despite the relevance of previously discussed findings, the work exhibits some limitations, which can trigger future developments. Firstly, available data were not enough to understand the real impact of the intervention of the two enterpirses on household electricity consumption. Hence, the effectiveness of the treatment in the Italian framework was measured only through self-reported behaviours. Future studies are needed to evaluate variations of energy consumption in the treatment group, both during the intervention and after it, to assess the staying effect on energy-saving habits and on capital stock. Also, the medium-term impact of the treatment on personal norms should be investigated, in order to understand the strength and the persistency of introjected social expectations. Lastly, the current research provides initial findings, different form extant literature (Göckeritz et al. 2010), about the potential interaction between personal norms and treatments based on normative influence; hence, future research can inform the debate about the influence of social expectations on the decision-making process of individuals endorsing favourable personal norms.

1 INTRODUCTION

Human influence on the climate system is unequivocal, as well as the warming of climate system: each of the last three decades has been successively warmer than any preceding decade since 1850, and the globally average surface temperature, considering both lands and oceans, is calculated to have increased around 0.85°C over the period ranging from 1880 to 2012 (Intergovernmental Panel on Climate Change [IPCC] 2014a). Anthropogenic greenhouse gas (GHG) emissions have increased since the pre-industrial era, mainly driven by economic and population growth (IPCC 2014a), and 97% of climate scientists consider them the dominant cause of the aforementioned climate warming (Cook et al. 2013). Therefore, unless anthropogenic GHG emissions are reduced, they will cause further warming and long-lasting changes in natural and climate systems, increasing the likelihood of severe and irreversible impacts for humans and ecosystems (IPCC 2014a). Over the next decades, GHG emissions should be reduced enough to achieve the international objective agreed by worldwide governments during COP21, namely to limit average global warming to well below 2°C relative to pre-industrial levels (United Nations [UN] 2015).

It is worth acknowledging that climate change is not the only environmental challenge threatening natural ecosystems. Other examples of sources of concern relate to resources exploitation and pollution: since 1980s, humanity has been in ecological overshoot, with an annual demand of resources exceeding Earth capability to regenerate natural resources (Wackernagel et al. 2002). This has been appraised by comparing overall ecological footprint, which measures the ecological assets required by worldwide population to produce the natural resources it consumes and to absorb its waste, with the biocapacity, which is the productivity of the planet ecological assets (WWF, GFN and ZSL 2012). Regarding pollution, it refers to air, land and water resources degradation and contamination, proved by increasing ocean litter, soil contamination and depletion by pesticides and fertilizers, and air contamination caused by particulate matter from, for instance, industrial processes and transportation.

Two complementary strategies widely adopted in the literature to address climate change risks are adaptation and mitigation. Nonetheless, comparable strategies are suitable to

cope with any kind of anthropogenic environmental issue, like resources depletion and pollution. Adaptation is mainly a reactive measure, as it refers to actions undertaken to adjust to the consequences of past, current and future changes of climate systems; instead, mitigation acts on prevention, in terms of reducing GHG emissions, and hence it tackles the causes of climate change (Tompkins 2005). Given the urgency and the complexity of facing climate change and environmental challenges, single strategies are not sufficient by themselves: effective implementation depends on policies and cooperation at all scales and can be enhanced through integrated responses aiming at connecting adaptation and mitigation with other societal objectives, like sustainable development. Interventions based on adaptation and mitigation are enabled by a pool of factors, like effective institutions and governance, innovation and investments in environmentally sound technologies and infrastructures, and sustainable behavioural and lifestyle choices (IPCC 2014a).

Nevertheless, there are limits to the effectiveness of strategies relying on adaptation, especially with greater magnitudes of changes to natural ecosystems (IPCC 2014a). Thus, in order to increase the sustainability and the resilience of human and natural systems in 21st century and beyond, and to increase the prospects and reduce the costs for adaptation, it is required to act on the mitigation side, by substantially reducing GHG emissions and resources depletion over the next few decades, attaining even more radical measures by the end of the century. As part of mitigation strategies, changes amongst individuals' choices, behaviours and attitudes are of strategic importance. In fact, besides reducing their direct emissions -e.g., by saving electricity at home-, they can assume many roles to promote a more sustainable society, like being a low-carbon consumer -e.g., by buying light packaging products-, a low-carbon employee -e.g., through professional decisions-, and a low-carbon citizen -e.g., supporting a green policy (Whitmarsh et al. 2009). Furthermore, also the World Bank [WB] (2015) underlined the importance of overcoming the inertia rooted in behaviours of individuals and organisations in order to properly react to environmental challenges. Indeed, in the industrialized world, individuals grow accustomed and used to carbon- and resource-intensive lifestyles, as well as many people in developing countries -or, at least, they aspire to do so. An important aspect in the path of changing

individuals' behaviours to achieve meaningful progress toward sustainability is that simple and easy changes are not sufficient: individuals should be led to become more interested in radical solutions, like the anti-consumption paradigm, which envisages responsible consumption, consumption reduction and voluntary simplicity (Peattie and Peattie 2007). Although economic incentives -like carbon pricing and incentives for recovery second-hand materials- are required to influence actors' behaviours, they are not the only tool in the hand of policy and decision makers. Since behavioural inertia arises from psychological and ideological sources, it can be addressed through behavioural programs with the twofold objectives of changing behaviours and of generating support to environmental policies, which are required to perform a transition to low carbon- and low resources-intensive technologies.

Simultaneously, growing attention and interest is paid from leaders of public and private bodies to the integration of behavioural and psychological sciences, in the discipline of policy design. Behavioural interventions are not simply fashionable and up to date programs, for a niche of public authorities: they are adopted worldwide by governments, regulatory bodies, public organisations, across a wide range of sectors and policy areas, among which there is also environmental protection and conservation. For instance, United Kingdom, one of the first countries which explicitly adopted behavioural insights to regulatory and interventions design, has applied them across a wide range of policy domains, like health (Department of Health 2010), GHG emissions reduction (Department for Energy and Climate Change 2009, 2010, 2012; Department for Energy and Climate Change/Chatterton, 2011) and more general environmental or sustainability issues (Department for Environment, Food and Rural Affairs 2006, 2010). Beyond these first applications, a study published by Organisation for Economic Cooperation and Development [OECD] (2017) reports more than 100 case studies of behavioural insights applied to consumer protection, education, finance, health and safety, labour market policies, public service provision, taxes and telecommunications. Many interventions also direct their efforts to tackle environmental issues: among the reported cases, 6 refer to energy consumption, and 9 to environmental conservation in general -e.g., water and food

waste. However, these programs can be applied to any sector, beyond those already mentioned.

Behavioural sciences answer policy makers' needs of simple and effective mechanisms to efficiently promote relevant outcomes. They contribute with an inductive approach to policy making: stemming from the integration of cognitive science, psychology, economics, and the methods of experimental psychology they explore actual patterns of individuals' behaviours, to challenge the pillars of traditional economics, which is not effective at predicting individuals' behaviours (Brekke et al. 2008). They increase the level of understanding by practitioners from public and private bodies of human behaviours, allowing them to promote behavioural change through a more scientific and informed approach. Therefore, they are a powerful tool in the hand of policy makers to directly influence individuals' behaviours and to increase the acceptance of environmental policies, in the transition to more sustainable and resilient systems. When dealing with the design of interventions pursuing environmental outcomes, there two main fields to apply behavioural insights. The former relates to the integration of them in the design of public policies, defined as a set of actions that contribute to the solution of a shared problem, or unmet needs, values or possibility of improvements (Dunn 2003). The latter entails that profit and non-profit organisations consider behavioural sciences contribution in the design of social marketing programs. Social marketing is "the use of marketing principles and techniques to influence a target audience to voluntarily accept, reject, modify, or abandon a behaviour for the benefit of individuals, groups, or society as a whole" (Kotler et al. 2002, p. 394).

As far as public policies are concerned, the central role of governments to cope with environmental challenges is clear, as they have dramatic influence on individuals carbon and ecological footprint (Hale 2008): as already mentioned, not only they can apply traditional economic tools, like determining the carbon intensity of the national energy mix, but also, they can design behavioural interventions that, on the one hand, directly influence citizens' choices, and, on the other hand, reduce potential resistance among the electorate toward the introduction of new pro-environmental regulations (Thøgersen and

Crompton 2009). However, the potential stemming from the application of behavioural insights to public policy is still not unleashed. So far, behavioural insights appear to be applied only in the late stages of the policy design, to improve implementation and increase compliance from target groups (OECD 2017). However, if they are taken into consideration since the early design of policies, it is possible to prevent the correction of issues once a policy is implemented, or even better, to avoid the implementation of ineffective practices.

Concerning social marketing, it plays an interesting role in addressing environmental issues as it aims at introducing a socially relevant dimension within the marketing discipline: it seeks to influence and change individuals' behaviours to increase the well-being of individuals themselves and/or of the society at large (Andreasen 1994). Thus, the beneficiary is not the marketer itself, but rather, it is either the target individual -like programs designed to promote breast self-examination-, or the society at large -for instance, campaigns to increase recycling-, or the two together -like the promotion of energy-efficient behaviours, where the target individual faces financial savings and CO2 emissions are reduced (Andreasen 1994). Social marketing can be applied to any domain where it is possible to market "an abstract product" consistent with what is commonly perceived as a social good, like safe driving, eating healthy, tobacco use reduction, and environmental protection. One of the most famous private programs pursuing individuals' behavioural changes was developed by Opower, a US based utility company: it proved that by providing households with the information about their own energy consumption compared to that of their neighbours for a significant period of time, on average, they reduced the electricity usage by 2% (Alcott 2010). A final speculative remark about social marketing intervention is that, since they can be also implemented by for-profit organisations, it is important to understand which is the actual beneficiary of the program: whether it is the organisation itself, leading to a stronger focus on business opportunities, rather than contributing to the social outcome.

The research contained in this thesis seeks to contribute to the design of policies and programs aiming at increasing individuals' willingness to engage in environmental behaviours, and individuals' environmental awareness and disposition. To achieve such

changes in disposition and habits able to encourage individuals to accept radical concepts, it is needed to integrate interventions leveraging both on one's environmental background and on behavioural mechanisms. Stemming from the lack of studies addressing the relative importance and the interactions between behavioural programs and individuals' environmental disposition, this work investigates how normative interventions relate to individuals' environmental beliefs and norms. Specifically, two empirical contributions are implemented: the first is a field experiment carried out jointly with two large energy companies, to test a social marketing program to reduce household energy consumption in the Italian context. In this project, a survey has been developed to investigate, on a mass scale and in a natural environment, the interactions between the medium-term exposure to normative interventions and personal norms. The second empirical contribution is an online experiment, where participants have been exposed to different treatments, combining two behavioural mechanisms, one leveraging on individuals' environmental self-identity and the other on social norms, so as to maximise the number of people engaging in a generic pro-environmental behaviour. By investigating the interactions between environmental background and interventions based on social norms, the research provides practitioners from private and public bodies with preliminary results about where to target the focus of interventions aiming at influencing individuals' decision-making processes and triggering behavioural changes towards more sustainable habits.

Empirical contributions provide some relevant insights. In both studies, the environmental disposition, mainly in the form of personal norms, proved to be a central determinant of pro-environmental behaviours, regardless the structural characteristics of such decision. Further, twofold benefits were detected for normative interventions: not only they influenced decision-making process when the relevant choice was made, but also, they affected the feeling of moral obligation to behave pro-environmentally; hence, the prolonged exposure to social influence led to an introjection of social expectations, which strengthened environmental disposition. Finally, contrary to expectations and to past studies, the online experiment did not manage to maximise the number of people acting environmentally-friendly. Indeed, although social norms positively influence decisions towards the desired outcomes, the manipulation of environmental self-identity resulted in

a negative spillover effect -namely, the fact that having performed a pro-environmental behaviour in the past, inhibited individuals to engage in new ones.

The work is organized as follows. Section 2 reports a review of the literature of main concepts and most relevant case studies concerning environmental interventions, based on normative influence and on environmental disposition. Moreover, identified literature gaps are addressed and corresponding research questions proposed. Section 3 and Section 4 discuss interventions design and results of the two empirical steps. Section 5 concludes, with a general overview of insights and elements of novelty of the studies, their policy implications, limitations and future developments.

2 LITERATURE REVIEW

2.1 BEHAVIOURAL ANTECEDENTS AND MOTIVATIONAL APPEALS

Traditional economic theory postulates that human decision-making processes and behaviours are based on purely rational choices (Pollitt and Shaorshadze 2013; Wilson and Dowlatabadi 2007), having rational preferences among outcomes, striving to maximise utility, and acting independently based on full and relevant information (Henry 2012; Weintraub 1993). Stemming from these assumptions, traditional persuasive incentives and policies aiming at encouraging pro-environmental behaviours are designed to leverage on the provision of information about environmental issues and protection (Frederiks et al. 2015), and on economic appeals (Bolderdijk et al. 2013; Evans et al. 2013). However, both exhibit some criticalities. Even though the provision of relevant information usually leads to an increase in knowledge and awareness, this increase does not necessarily translate into behaviour changes (Abrahamse et al. 2005; Gardner and Stern 1996; Porter et al. 1995). Regarding economic appeals, they rely on the assumption that people are primarily motivated by (economic) self-interest (Holmes et al. 2002; Miller 1999; Thøgersen 2011), and that they are not persuaded to change behaviours and habits unless some personal benefit is implicated (Penn 2013). Nonetheless, environmental issues and climate change are such large and urgent problems that the integration and coordination of multiple approaches in studying the human dimension in the transition to a more sustainable and resilient system is required, so as to increase the understanding of which general factors affect a wide range of pro-environmental behaviours, as well as the acceptability of environmental policies. Moreover, the traditional approach does not consider the broad set of elements affecting individuals' sources of motivation; evidence suggests that some people act in environmentally-friendly ways because they are intrinsically motivated to so: therefore, they behave pro-environmentally even though it is not extrinsically rewarding, and even if it entails personal costs or effort (e.g., Steg et al. 2014a). This is in line with the work of Ryan and Deci (2000), who provided the distinction among two main sources of motivation. Intrinsic motivation is defined as the engagement in an activity for the inherent satisfaction of the activity itself, while extrinsic motivation refers to undertaking an activity so as to attain some separable outcome. Van der Werff et al. (2013a) proposed a further

classification, arguing that intrinsic motivation can be distinguished in two types: enjoyment-based intrinsic motivation, reflecting whether the behaviour itself is interesting and enjoyable to do -a concept close to the definition of intrinsic motivation provided by Ryan and Deci (2000)-, and obligation-based intrinsic motivation, indicating whether one feels obliged to comply with a rule, norm or principle. Leisure activities are more likely to be related to enjoyment-based intrinsic motivation, while civic and environmental ones to obligation-based intrinsic motivation (Lindenberg 2011). Indeed, these actions are mostly not enjoyable and effortful, but they may elicit positive feelings by contributing to a good cause and by acting consistently with one's internal ethical standards (Thøgersen 2006), and therefore, maintaining a positive moral self-concept (Ariely et al. 2007; Mazar et al. 2008). Another element explaining why individuals are intrinsically motivated to behave pro-environmentally is the social nature of humans, which entails that they are not purely selfish and wealth-maximising actors. Rather, they value reciprocity and fairness, they are willing to cooperate to pursue collective goals, and to comply with common rules of behaviours (Brekke et al. 2008; Thøgersen 2006; WB 2015).

The reasons to which environmental campaigns for behavioural change appeal are of paramount importance, as they dramatically influence the individual's willingness to engage in new pro-environmental decisions (Thøgersen and Crompton 2009). The effect of an intervention on other pro-environmental behaviours beyond the ones initially targeted by the same program is named spillover (Poortinga et al. 2013). Spillover effects can be both aligned or adverse to environmental policies goals: while the former refer to the situation when the promotion of one environmentally-friendly behaviour increases the likelihood that individuals will engage also in other behaviours, the latter induce individuals to reduce other pro-environmental behaviour beyond the targeted one (Truelove et al. 2014). An example of the two effects is the potential reaction to the introduction of a plastic bag tax: beyond reducing the usage of plastic bag, people may also increase their level of recycling as a consequence of the policy (positive spillover), or decrease it (negative spillover). A deep understanding of these effects is clearly important in the design of climate policies. On the one hand, those policies endorsing positive spillover promise net positive environmental impact, thus policy makers should largely invest in them; on the

other hand, the overall effect of policies causing negative spillover should be evaluated case by case, and possibly redesign or avoid them. Therefore, it is important to understand the relation among the motivational appeals of one policy and its intended, as well as unintended, outcomes. Policies targeting mainly environmental, biospheric and moral reasons work on individuals' intrinsic motivation, and enable people to perceive policy compliance as a moral and ethical conduct, leading them to feel good about their decision to act (Bolderdijk et al. 2013), and to enhance their own moral self-concept (Carter 2011). They result in positive spillover effects across different behaviours, also in terms of individual decisions and policy support (Truelove et al. 2014). Instead, policies appealing mainly self-interested reasons leverage on extrinsic motivation, and entail several negative consequences. Not only they may inhibit positive spillover effects among different pro-environmental behaviours (Evans et al. 2013; Thøgersen and Crompton 2009), but they can also have negative long-lasting effects on a person's self-identity, as, if a person acts moved by self-interested reasons, this person may perceive him or herself as someone who acts for self-interested reasons, and decide not to act in the absence of a personal return (Ariely et al. 2007; Thøgersen and Crompton 2009). Moreover, in some cases they are even not effective at changing the target behaviour (Bolderdijk et al. 2013), and in case the external incentive is removed, the person is no more incentivised in engaging in the behaviour (Bolderdijk et al. 2011). Therefore, in order to guarantee overall positive results in terms of environmental protection and conservation, and to maximise the effectiveness of pro-environmental policies, it is important to act on individuals' intrinsic motivation and to create positive spillover effects. A further remark about motivational factors: moral considerations are less predictive of behaviours when contextual aspects strongly support the engagement in pro-environmental behaviours (for instance, if recycling bins are provided), suggesting that when behavioural costs are very low or the behaviour has become the norm, almost everybody adopts it, regardless individuals' intrinsic motivation (Steg et al. 2014a).

As already outlined, environmental policies have higher chances to achieve their goals if they target intrinsic sources of motivation. Hence, it is important to identify general antecedents of human behaviours, in order to effectively and consistently influence

environmental disposition and decision-making processes. Psychological and behavioural economics studies demonstrate that there are certain fundamental and persistent biases (Kahneman 2003a; Kahneman 2003b; Pollitt and Shaorshadze 2011; Stern 1992; Wilson and Dowlatabadi 2007), which derive from simple heuristics and mental shortcuts, affecting and simplifying human decision-making processes, especially in situations characterised by high levels of complexity, choice, risk and uncertainty (Gigerenzer and Gaissmaier 2011; Tversky and Kahneman 1973; Tversky and Kahneman 1975). Stemming from a thorough review of the literature on human decision-making, the WB (2015) identified few principles which work as general antecedents of human behaviours, and which can be targeted to effectively promote behaviour changes.

1. *Thinking automatically:* in general, people make decisions and judgements automatically and retain the status quo. Therefore, by changing the choice architecture, namely framing and default choice, it is possible to dramatically change the outcome of individuals' behaviour.
2. *Thinking socially:* given the social nature of humans, i.e. the tendency to associate and behave as members of groups, individuals' behaviour is often affected by the social environment, in terms of social meanings, norms and networks. This type of influence tends to be related to specific behaviours and to be socially enforced. Understanding and leveraging on these mechanisms can pull people towards certain patterns of collective behaviours, as well as devising more innovative and effective interventions.
3. *Thinking with mental models:* different members of the same society tend to conform to concepts which reflect the shared understanding of the community, without questioning them. These mental models include categories, concepts, identities, prototypes, stereotypes, and worldviews. They often capture broad ideas about world functioning and one's place in it. Since mental models do affect individuals' decision making, understanding and considering them open up the possibility of new levers for policy and communication strategies, and highlight potential problems in design and implementation phases.

The current research aims at leveraging on specific instances of the last two behavioural mechanisms. *Thinking socially* includes all the policies interacting, somehow, with the concept of norms. According to the definition provided by Cialdini et al. (1991, p. 202) the term norms "can refer either to what is commonly done -that is, what is normal- or to what is commonly approved -that is, what is socially sanctioned". Therefore, the Focus Theory of Normative Conduct distinguishes between two types of norms: descriptive, representing the behaviour displayed by most individuals, and injunctive, that is what people commonly approve (or disapprove) (Cialdini et al. 1991). In the literature, the concept of injunctive norms has been related to subjective social norms (Doran and Larsen 2016; Park and Smith 2007; Thøgersen 2006); the perceived behavioural social pressure -namely subjective social norms- even if empirically different from injunctive norms, strongly derives from what is commonly approved or disapproved. Since mental models comprises, inter alia, identity and self-concept, *Thinking with mental models* refers also to interventions leveraging on environmental self-identity, Specifically, the analysis focuses on how social norms and environmental self-identity and disposition affect personal norms, described as the feeling of moral obligation to engage in a specific behaviour (Schwartz 1977). Indeed, personal norms derive from the influence of many factors. According to Thøgersen (2006, 2009), they can be distinguished in two levels of interiorization and integration into the self, with different motivational drivers: introjected and integrated personal norms. The former refer to norms which have been accepted and internalised superficially stemming from social norms, without a reflection to connect behaviours and personal values and goals; behaviour is controlled by expected reward and punishment, but reinforcements originate in the individual, not in the external environment. The latter derive from a deep and elaborate processing of integrating them in the self-concept, based on a conscious reflection on and evaluation of behavioural consequences and results; thus, compliance with personal norms is motivated by personal values and goals. Empirical evidence supports the relations among these constructs too. According to Thøgersen (2006), pro-environmental behaviours are usually correlated with both personal and subjective social norms; nonetheless, the author demonstrated that a wide range of environmentally-friendly behaviours depend directly on personal norms, while subjective social norms are

still important, but indirectly, through their interiorization and evolution in personal norms. Moreover, a study by Doran and Larsen (2016) found that when controlling for the three norms constructs -i.e., subjective social norms, descriptive norms and personal norms-, only descriptive and personal norms significantly contribute to explain variance in intentions of engaging in eco-travel options; however, personal norms mediate the effect of subjective social norms on behavioural intentions. Instead, Van der Werff and colleagues (2013a) stated that environmental self-identity influences behaviours as it elicits feelings of moral obligation to do so. The authors found empirical support to this line of reasoning, by showing that the stronger one's environmental self-identity, the greater the personal norms, and the willingness to engage in pro-environmental behaviours; moreover, personal norms mediated the relationship between environmental self-identity and the willingness to behave pro-environmentally.

It is possible to link personal norms construct and the motivational appeals targeted by environmental policies. According to the classification provided by Ryan and Deci (2000), while introjected personal norms are closer to the concept of extrinsic motivation, internalized ones are likely to act on intrinsic motivation. The authors clarified also that extrinsic motivation can be internalized and integrated into the self to a different extent: the higher the degree of internalization and integration, the higher the norms compliance, the behavioural effectiveness and the volitional persistence. On the contrary, the concept introduced by Van der Werff et al. (2013a) of obligation-based intrinsic motivation is soundly related to personal norms, as they both work on the feeling of moral obligation - in the experiment, the authors directly measured obligation-based intrinsic motivation in terms of personal norms. Therefore, it is possible to conclude that personal norms are a source of intrinsic motivation, but their impact on individuals' behaviour depends on the level of elaboration and integration in the self. This perspective is also supported by empirical evidence: even though both introjected and integrated personal norm are positively correlated with the engagement in pro-environmental behaviours, integrated norms are stronger predictors compared to introjected norms (Thøgersen 2006). Figure 1 reports a continuum between social and personal norms, considering their level of internalization in the self and the typology of motivational appeal.

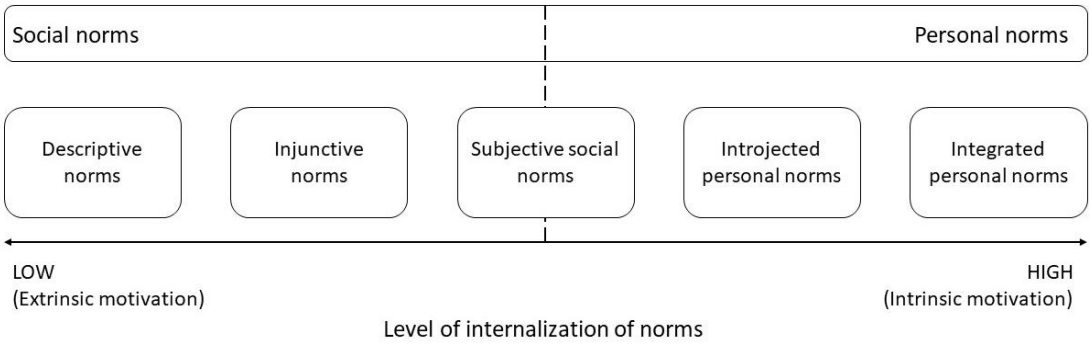

FIGURE 1. CONTINUUM BETWEEN NORM TYPOLOGIES AND SOURCES OF MOTIVATION

The focus on the interaction between personal norms with social norms and environmental self-identity is consistent with extant literature, which has proved that personal norms constitute the general reference focus for policies aiming at protecting the environment (Bator and Cialdini 2000; Cialdini 2003; McKenzie-Mohr 2000). There are two main reasons explaining practitioners' interests in this construct. Firstly, there is unequivocal evidence that acting pro-environmentally in a wide range of domains is closely connected with personal norms (Bamberg et al. 2007; Bratt 1999; Harland et al. 1999; Hopper and Nielsen 1991; Nordlund and Garvill 2003; Ong and Musa 2011; Stern et al. 1999; Thøgersen 1999; Thøgersen and Ölander 2006); secondly, personal norms are a stronger predictor of pro-environmental behaviours compared to other psychological variables, like values and environmental concern, or socio-demographic characteristics, for instance age, education, political orientation (Mehmetoglu 2010). Finally, since personal norms are a source of intrinsic motivation, acting on them generates two types of benefits. Not only they directly influence the decision of engaging in a pro-environmental behaviour, but also, they amplify positive spillover effects (Thøgersen 2004; Thøgersen and Ölander 2003) and increase policy acceptability (Steg et al. 2015).

A final remark refers to the term "pro-environmental behaviour" and equivalents. Even though they include any action with a positive impact on the environment, there are some categories in which pro-environmental behaviours can be grouped according to the degree of commitment required to engage in them (Stern et al. 1999):

1. Personal or private-sphere behaviour change -e.g., consumer choice of light-packaging products
2. Passive acceptance of public policies which effects may depart from the promotion of immediate personal interest -e.g., voting a political party proposing environmental taxation
3. Low-commitment active citizenship -e.g., financially supporting pressure groups
4. Committed public activism -e.g., participation in public demonstrations.

Despite the relevance of active and passive political engagement and citizenship, this work focuses on the first category of behaviours -thus, when terms as "pro-environmental behaviours" or equivalent ones are mentioned, they refer to personal or private actions. This decision is motivated by the fact that private-sphere behaviours are the first step to convince individuals to adopt more sustainable lifestyles and habits. Nevertheless, given the ambitious changes in individuals' behaviours and attitudes needed to effectively tackle environmental issues, positive spillover effects may occur among pro-environmental behaviours of the first category, but also from simple pro-environmental behaviours to more ambitious and significant actions (Hounsham 2006). These positive effects can be explained by the self-perception theory (Bem 1972). Firstly, individual's attitude towards the engagement of a specific behaviour may evolve, and, as a consequence, increase the likelihood that the person will engage in the same behaviour in the future (Holland et al. 2002). This mechanism accounts for the persistence in adopting a specific pro-environmental behaviour more than once. For instance, the same person who initially had no disposition to recycle, may adjust her or his attitude towards recycling because she or he recycles, if persuaded to do it. Secondly, engaging in a pro-environmental behaviour may activate a general personal environmental disposition, which may increase the likelihood of engaging in future pro-environmental behaviours (Cornelissen et al. 2008). Therefore, it allows to shift an initial appeal, which could be even relying on self-interest benefits or to external pressure, to one based on one's moral concept. This mechanism influences positive spillover between pro-environmental behaviours. For example, if a person recycles, this behaviour in itself has a positive impact on her or his environmental self-identity. According to this second mechanism, it is possible to "hook" individuals with

easy actions displaying personal paybacks or pleasant effects -i.e., some behaviours belonging to the first category-, in order to encourage them to subsequently accept more difficult personal pro-environmental behaviours and to a greater public acceptance of governmental interventions (Thøgersen and Crompton 2009).

Sections 2.2 and 2.3 deepen the behavioural mechanisms underlying *Thinking socially* (Section 2.2) and *Thinking with mental models* (Section 2.3). They are structure following the same scheme: there is an initial general overview of the main concepts, their definitions, and the mechanisms leading them to be effective. Then, the most relevant case studies applied to pro-environmental behaviours are described; stemming from them, the final part outlines how to design policies based on the behavioural mechanisms in order to achieve positive and measurable outcomes.

2.2 Social norms

2.2.1 General overview and concepts definition

Even though it is widely recognised that economic incentives influence behaviours, the same cannot be said for social incentives (WB 2015). However, given the social nature of humans, individuals are highly susceptible to social influence: social norms are informal governance mechanisms able to dramatically influence decision-making and behaviours. Indeed, there is outstanding evidence that social norms have an impact in guiding individuals' choices and behaviours towards the desired outcome, even in the private sphere (e.g., Aarts and Dijksterhuis 2003; Cialdini et al. 1991; Griskevicius et al. 2006; Kerr 1995); marketing interventions and policies based on social norms have been applied in a widespread set of domains, (e.g., Alcott 2010; Donaldson et al. 1994; Ferraro and Price 2011; Goldstein et al. 2008; Larimer and Neighbors 2003; Neighbors and 2004; Nolan et al. 2008; Schultz 1999; Schultz et al. 2007), with the objective of. influencing individuals to engage in socially-desirable behaviours and reduce undesirable conduct (Schultz et al. 2007). Therefore, social incentives, which can be reconducted to the behavioural antecedent of *Thinking socially,* represent a valid, and cost-efficient alternative to interventions appealing to external and traditional sources of motivation. Beyond the motivational appeal and the limited amount of resources required by these programs,

another driver pushing the adoption of normative interventions is framing: in contexts where it is difficult or impossible to change the structural characteristics of the situation, such as personal costs and benefits, providing information about others' behavioural choices is a suitable approach to encourage the desired conduct.

Over the years, a sizeable volume of social psychologists and behavioural economists has documented the process underlying social influence and conformity. As already mentioned in Section 2.1, the Focus Theory of Normative Conduct (Cialdini et al. 1990) distinguishes between two types of norms: injunctive and descriptive. On the one hand, descriptive norms (or the norms of "is") represent the perception of what most people do (i.e. the standard behaviour). They can also provide information of the frequency of the occurrence of a behaviour of a specific reference group, which is the group to whom the norm is referred. They motivate decisions and choices as they provide information on what is the most effective and adaptive behaviour in a specific context; indeed, they allow people to save cognitive resources in their decision-making process: if an individual simply registers and imitates what the majority of others is doing, he or she can decide in an efficient and secure fashion. They leverage on informational social influence, which is based on the desire to form an accurate interpretation of reality and behave correctly (Deutsch and Gerard 1955). So, for instance, a person can simply follow other passengers in an unfamiliar train station in order to find the exit. On the other hand, injunctive norms (or the norms of "ought") describe the perception, or the actual information, of what is commonly approved or disapproved. They influence behaviours as they anticipate either social rewards or punishment (informal sanction). They reflect the moral rules of the group. They appeal to normative social influence, which motivates individuals as if they comply with norms, they will gain social approval and will avoid social sanctions (Deutsch and Gerard 1955). Thus, for example, a person might refrain from littering the street for fear of social ridicule or disapproval. Moreover, they can also have an impact on personal norms, through the process of internalisation of actual -injunctive norm- or perceived -subjective social norm- social approval resulting from displaying a moral conduct. Thus, they are more likely to become introjected personal norms. Additionally, the Focus Theory of Normative Conduct (Cialdini et al. 1991), supported by empirical evidence (Cialdini et al. 1991; Kallgren et al.

2000), states that norms motivate and shape behaviours when they are activated, which means when they are made salient. As a consequence, if an individual's attention is temporarily directed to the normative message, he or she will more likely act in norm-consistent ways. This can be explained considering also the behavioural antecedent of *Thinking automatically.* There are two types of action: routinized or habitual behaviour, and conscious decision. According to Fischer (2008), habitual behaviour is performed regularly, without reflection; it is functional, as it spares individual the time and effort of decision-making on often faced situations; however, it can lead to suboptimal results. In order to include new norms and considerations in the decision-making process, a conscious decision needs to be taken. This process of realization that there are various alternatives to choose from, and of elaboration and evaluation of different motives -such as social norms and personal considerations- to decide how to act is called norm activation.

In the scientific literature, further explanations underlying why social norms affect people behaviours have been proposed. A first explanation is rooted in behavioural economics, as standard economic analysis is not capable to predict individuals' contribution in public good games. Indeed, climate change and environmental issues are inherently public goods problems (IPCC 2001), as the consumption of them by one individual does not reduce the amount available to be consumed by another individual, and individuals cannot be excluded from accessing them (Gravelle and Rees 1992). Atmosphere composition and environmental quality are the result of everyone contribution and no single actor, be it a large enterprise or a nation, can individually and effectively tackle them. According to traditional economic theories, with rational, self-interested and independent economic actors no one has private incentive to invest, produce and consume in such a way that contributes to the public good, reaching the outcome of the 'tragedy of the commons', namely the complete depletion and spoil of the common good through users' collective action (Hardin 1968). On the contrary, behavioural economics and social sciences highlight that people follow complex decision-making processes characterised by cognitive limitations and diverse objectives, and which are influenced by many factors (Brekke et al. 2008). The scientific literature proposed by these disciplines reports many experimental studies trying to understand under which conditions individuals are willing to cooperate in

public goods (Brekke et al. 2008). Importantly, empirical evidence demonstrates that individuals' willingness to cooperate increases with their perception of contribution of others (e.g., Gächter 2007; Frey et al. 2004; Shang and Croson 2006). This phenomenon is known as conditional cooperation: many people are willing to cooperate, but only if others do it too. Therefore, disseminating information about the behaviour of others- namely, providing the descriptive normative information- is an important way to overcome the commons dilemma, as individuals are more likely to reduce their usage of the good if they believe, or get to know, that others who share access to the common limit their use too (Schultz 2002). A second mechanism explaining why descriptive norms influence individuals' decision-making consists in providing the correct information about the occurrence and the approval of undesirable behaviours. Indeed, the underlying assumption of these interventions is based on two consistent findings: on the one hand, most individuals tend to overestimate the prevalence of many undesirable behaviours, and their general acceptability; on the other hand, individuals use this perceived common behaviour and judgement as comparison for their own conduct (Borsari and Carey 2003; Schultz et al. 2007). Therefore, social norms marketing campaigns and policies seek to reduce the occurrence of undesired conducts by correcting targets' misperceptions regarding the behaviours' prevalence and approval.

Practitioners can select how to adopt social norms to the design of policies and of social marketing interventions from a set of predefined patterns of interactions (WB 2015):

1. Designing interventions to "work around" the behavioural effects of social norms: in some cases, policy makers may be able to circumvent the behavioural effects of social norms.
2. "Marketing" existing social norms to shift behaviour: correcting the misperception about the frequency and the acceptance of specific behaviours by providing the actual social norm. In fact, by understanding what others do and think, people may shift their understanding of existing social norms and conform to them.

3. Activating norms to shift behaviours: providing the salient information when the decision of engaging in the behaviour is made, so as to direct it to the desired outcome.
4. Changing social norms to shift behaviour: although norms are trivial to be changed, it is possible to do it, for instance through law, which can act both on actions themselves, but also on their social meaning. Indeed, since individuals can come to value things they experience and are familiar with, legal changes that affect the short-term benefits and costs of actions can actually contribute to longer-term and self-sustaining behaviour changes. Nevertheless, when laws promote actions too far from existing norms, they are unlikely to induce the desired social changes. Moreover, informal strategies can also be effective in changing norms, for instance through the use of mass media.

The general focus of pro-environmental interventions is directed to a combination of the second and third categories, as they aim at influencing decision-making by "marketing" actual social norms, and by activating them, so as to influence individuals' behaviours to the desired outcome.

2.2.2 Case studies analysis and relevant findings

Historically, social norm approach emerged in the late 1980s (Burchell et al. 2013), in the context of substance abuse (like alcohol, cigarettes and drugs) among university or college student (see the reviews of Berkowitz 2004; Bosari and Carey 2003; McAlaney and McMahon 2007; Moreira et al. 2009; Neighbors et al. 2008; Perkins 2003). Over the years, the adoption of normative interventions has been analysed by economists and psychologists in the domain of pro-environmental behaviours, and now it is widely adopted in this context too. Some examples from the scientific literature deal with recycling (Schultz 1999), food waste (Nomura et al. 2011), energy consumption both in the form of academic studies (Cialdini and Schultz 2004; Harries et al. 2013; Nolan et al. 2008; Schultz et al. 2007) and of commercial activities by private companies like Opower in the USA (Allcott 2011), sustainable lifestyles (Rettie et al. 2010), and household water consumption (Ferraro et al. 2011; Ferraro and Price 2013). The following section reports an overview of the most

relevant studies performed in the domain of environmental behaviours, and the related findings.

The preliminary studies were performed by Cialdini and colleagues (1990, 1991), who applied normative interventions to decrease public littering, in California. Through a field experiment, the authors investigated under which conditions the two norm constructs more effectively influenced behaviours (Study 1, Study 2), the difference between injunctive and descriptive norms and when the two have congruent or contradictory implications for behaviours (Study 4). In Studies 1 and 2, subjects were exposed to different environmental conditions: either to a heavily littered floor of the parking area (pro-littering descriptive norm), or to a clean floor (anti-littering descriptive norm). Furthermore, also the salience of the environmental condition was varied, through the help of an experimental confederate: in order to direct the attention of the target individuals to the condition of the floor, the confederate dropped a handbill close to the subjects. Results show that individuals tended to litter more in an already littered environment, as they were exposed to a descriptive norm indicating that the standard behaviour was littering; similarly, those individuals exposed to a clean environment were less likely to litter. These outcomes were even magnified when the attention of individuals was focused on the state of the environment: in a littered (clean) setting, subjects in the high-salience treatment littered at a greater (lower) rate compared to those subjects who were exposed to the same environment but not focused on it. Therefore, increasing the salience of normative information actually increases the behavioural compliance with it. Then, in Study 4, the authors replicated the conditions of the first two studies, but they added an injunctive norm cue, in the form of swept (presence of injunctive norm) or unswept (absence of injunctive norm) litter. Individuals exposed to the conflicting situation, that consisted in anti-littering injunctive norm and pro-littering descriptive norm, reduced littering compared to the pro-littering descriptive norm only, but increased it in comparison of the anti-littering descriptive norm only. This entails that both descriptive and injunctive norms can elicit behavioural change, with the prominence of one or the other type of norm accounting for the direction of the change. A further result is that conflicting normative messages reduce the effectiveness of normative interventions. Following this line of

research, a more recent study by Cialdini and colleagues (2006) demonstrated that it is important to draw attention only on social norms that are consistent with the goal: visitors to Arizona's Petrified Forest National Park were exposed to different normative messages displaying the descriptive (''Many past visitors have removed the petrified wood from the park, changing the state of the Petrified Forest'') or the injunctive ("Please don't remove the petrified wood from the park") information, to reduce the rate of petrified wood theft. Injunctive normative messages that such theft was strongly disapproved allowed to significantly reduce this undesired conduct compared to conflicting normative message, namely descriptive normative messages saying that the misconduct was regrettably frequent. As a consequence, in situations characterised by high levels of undesired behaviours, practitioners should avoid to mobilise action against socially disapproved conducts by displaying the information about the standard behaviour and labelling it as regrettably frequent, but rather, focus the audience on what is approved or disapproved in that situation.

Of particular relevance is the field of household energy consumption, where normative interventions have been mostly applied. A review by Fischer (2007) of studies explicitly designed to apply normative messages to reduce electricity consumption identified 26 projects from ten countries all over the world. An unequivocal result of her analysis is that feedbacks do stimulate electricity savings, with an average usage reduction between 5 and 12% -the overall range encompasses from no results, achieved by a limited number of works, up to 20% reduction. Nonetheless, the review highlighted noteworthy differences across different nations and cultures: for instance, UK (International Energy Agency – Demand Side Management [IEA-DSM] 2005) and Sweden (Sernhe et al. 2003) citizens are interested in comparison with their own previous consumption, but they are much less interested in comparison with other households. Instead, Finnish (Haakan et al. 1997) and Japanese (Ueno et al. 2005) customers prefer comparisons with others than with own previous consumption. These differences in preferences and in potential outcomes of normative interventions do not allow to easily apply results from other countries to a specific national situation. An innovative contribution was provided by Schultz and colleagues (2007), who explored, in a field experiment carried out in California, how

normative information differentially affects the target behaviour depending on whether the message recipients' behaviour is above or below the norm. The authors assigned the participants to one of the following treatment conditions: descriptive information, where the treatment displayed information concerning the house energy consumption, the information about the actual energy consumption of the average households of the same neighbour, and tips to conserve energy; descriptive and injunctive information, where participants received the same information of the former treatment with a key addition representing the injunctive norm: if the household had consumed less than the average of its neighbour, it received also an happy smile, otherwise a sad face. The results showed the "constructive, destructive and reconstructive" power of social norms: interventions based on descriptive norms did constructively and significantly decrease energy consumption in households consuming more than their neighbours. However, the destructive power of descriptive norms revealed an undesired "boomerang effect" in those households consuming less energy than the average and exposed only to the descriptive information, as they significantly increased their consumption level compared to their baseline. This boomerang effect can be explained by analysing the mechanism underlying descriptive norms: individuals measure the appropriateness of their conduct as deviation from the standard behaviour, either they are above or below it. Therefore, by increasing the salience of descriptive norms, those individuals who initially adopt the behaviour at a rate below the standard may actually end up in an increase engagement in the undesired behaviour. However, when the message conveyed both the descriptive and injunctive information, the boomerang effect did not exhibit anymore; not only households consuming less than the standard value did not significantly increase their energy usage, but also, those consuming more than the average reduced even more their consumption compared to the descriptive-only situation. As a consequence, the effect of descriptive normative interventions leads to a negative outcome on those individuals who already engage in the constructive behaviour; however, this unintended consequence can be easily prevented by adding an injunctive element of approval. Similar results were obtained both in previous studies, which showed that households with an initial low consumption level do not feel encouraged to reduce their usage (Bittle et al. 1979; Brandon and Lewis 1999), and in studies applying social

norms to other environmental behaviours, like recycling (Schultz 1999), water consumption (Ferraro et al. 2011) and towel reuse (Goldstein et al. 2008). Another recent study was performed in California by Nolan and colleagues (2008, Study 2), so as to understanding the impact of different appeals to encourage household energy consumption reduction. Participants were divided in groups and exposed to different appeals motivating energy saving: to protect the environment, to benefit society, or to save money. The final type of information was a descriptive norm indicating that the majority of the recipient's neighbours conserved energy. Results showed that the group exposed to the normative intervention was the one using the lowest amount of energy both immediately after the intervention and one month after it: this means that normative information stimulated subjects to save more energy than any traditional appeals. Stemming from the results of these experiments, the energy company Opower conducted a series of large-scale programs in US, where residential utility customers were mailed with "home energy reports", displaying information about their own energy consumption compared to that of their neighbours, and the corresponding injunctive information. This treatment was capable to decrease energy consumption over the short term, as well as on a longer time horizon: indeed, treated customers seem to develop new consumption habits and acquire a new stock of physical capital (e.g., energy-efficient lightbulbs). It led to an average decrease in energy consumption by 2%, a result equivalent to the effect of a short run increase in electricity price of 11-20% (Alcott 2011), with considerable lower cost than traditional interventions: instead of costing between 1.6 and 3.3 cents per kilowatt hour of electricity saved, they are between 1.4 and 1.8 cents (Allcott and Rogers 2014).

The short-run and long-run effects of social norms, and their effectiveness compared to other motivational appeals have been also studied in the context of recycling in California (Schultz 1999), and of water conservation in Georgia (Ferraro et al. 2011; Ferraro and Price 2013). The intervention by Schultz (1999) aimed at increasing the rate of curbside recycling among residents using feedbacks targeting personal and social norms and through the provision of environmental information. Households were randomly assigned to one of the following experimental conditions: plea; plea and written feedback targeting personal norms, displaying the amount of material collected at the house during the previous week;

plea and written feedback targeting social norms, exhibiting the information of the quantity of material collected at residential level; plea and information about recycling and the related environmental benefits. Results demonstrated that feedbacks targeting personal and social norms effectively improved curbside recycling, while no significant changes were detected in the other three experimental conditions, like in the experiment by Nolan and colleagues (2008). However, only the group exposed to social normative message showed long-lasting results. Moreover, consistently with results of Schultz and colleagues (2007), they also found that feedback interventions have a greater influence among residents for whom the feedback was more discrepant from past behaviour, both in positive and in negative; this means that the degree of discrepancy between the information conveyed and the household behaviour is directly related to the amount of behaviour change. The experiment by Ferraro and colleagues (2011) was performed in collaboration with the agency of the Cobb County Government supplying residential customers with water, to reduce final users' water consumption. Households were assigned to one of the following treatment conditions: provision of technical advice about how to reduce water use; provision of technical advice as well as personal normative appeal; and provision of technical advice augmented with descriptive normative information. In the short run, both norm-based messages proved to be effective at reducing water consumption, with greater results achieved with interventions targeting social rather than personal norms. On the long run, the group receiving the messages displaying the descriptive norms was the only one which continued to consume less water even after two years after the treatment assignment.

A final important contribution was provided by Goldstein and colleagues (2008), who investigated the impact of different messages on participation in a towel reuse program of a hotel in Southwest, US. The different messages were based either on the industry standard environmental information ("HELP SAVE THE ENVIRONMENT. You can show your respect for nature and help save the environment by reusing your towels during your stay.") or on descriptive norms ("JOIN YOUR FELLOW GUESTS IN HELPING TO SAVE THE ENVIRONMENT. Almost 75% of guests who are asked to participate in our new resource savings program do help by using their towels more than once. You can join your fellow

guests in this program to help save the environment by reusing your towels during your stay."). Consistently with previous studies, they obtained significantly higher participation in the program with the message based on the descriptive norms compared to the traditional environmental one. Moreover, the authors varied the group to which the norm was referred, and proved that the level of adherence to social norms highly depends on the reference group. Surprisingly, instead of achieving higher level of compliance from norms which made salient personal similarities -like gender, citizenship, values-, the greatest level of adherence was reached with norms displaying information of behaviours of individuals who had previously stayed in the same room of the hotel. This entails that individuals are more willing to comply with norms based on immediate surroundings in terms of situational factors, rather than personal characteristics.

A concluding reasoning related to experiments investigating the importance of different motivational appeals is proposed. Empirical evidence shows that normative information spurred people to behave more pro-environmentally than any of the standard appeals that is usually adopted, like economics savings, and environmental and moral considerations. It is plausible that environmental protection and social responsibility appeals resulted less effective than social norms because people motivated by these reasons already engage in conservation efforts (Nolan et al. 2008). Therefore, by targeting further elements beyond environmental protection and social responsibility, normative interventions reach individuals who might not otherwise have a reason to behave pro-environmentally.

2.2.3 Design of normative interventions

As Section 2.2.2 explains, normative interventions are more likely to influence behaviours under a specific set of conditions. Indeed, while moving from social norms down to the final behaviour, there are many moderator variables which have an impact on the efficacy of the treatment.

1. *Salience*: norms effectively shape individuals' behaviours when they are activated
2. *Reference groups*: the extent to which an individual complies with norms depends on whether the individual categories her or himself as a member of the group. In

this case, the individual is more likely to engage in attitudes and behaviours which are common among the other members of the group.

3. *Existing habits and beliefs:* normative social influence is lower in case the individual already holds beliefs about the specific behaviour and exhibit pro-environmental habits
4. *Norm conflicts*: to maximise the impact of social norms, and to avoid boomerang effects, it is needed to align the message conveyed by the descriptive and the injunctive norm.

2.3 Environmental background and self-identity

2.3.1 General overview and concepts definition

Over time, social and environmental psychologists have proposed a significant number of models to explain people's pro-environmental conducts (Klöckner 2013a). Initially, their strategy consisted in focusing on individuals' behaviour and how to change it; notwithstanding, given the importance of motivational appeals targeted by environmental policies, in the last years the focus has shifted toward the investigation and the comprehension of the process of behavioural change, and how moral considerations enter the decision-making process in the environmental domain (see Steg et al. 2012, for a synopsis of the developments from a European perspective). The importance of this shift is not only attributable to the design of more effective environmental interventions and to increase the possibility to trigger positive spillover effects (see Section 2.1); but also, if policy makers are aware of the internal moral drivers leading to pro-environmental conducts, like values, beliefs and personal norms, they have the opportunity to design policies targeting these behavioural antecedents, so as to increase their presence in a noteworthy number of community members. Therefore, policies based on this stream of literature, on the one hand consider *mental models* to implement more effective interventions; on the other hand, policies target these *mental models* in order to increase the level of acceptance and of understanding of general sustainable concepts, like identities, prototypes, stereotypes, and, worldviews. This latter breed of policies allows to motivate people to engage in sustainable lifestyles stemming from the direct creation of a

pro-environmental personal background, resulting in a lower need of other policies acting to change the specific individuals' habits.

The wealth of literature investigating the process of behaviour change to more environmental practices emphasises the role of moral considerations. Morality has been defined by Turiel (1983, p.3) as "prescriptive judgements of justice, rights and welfare pertaining how people ought to relate to each other". Although this description does not include other living beings beyond humans -namely, animals and plants-, the concept has been extended to include also nature conservation and protection. Already in the seventies, Heberlein (1972) suggested that moral considerations underlying pro-social behaviours motivated, under certain conditions, pro-environmental behaviours too. Indeed, as long as living beings are ascribed rights and welfare, it becomes a moral issue whether to harm or protect them (Klöckner 2013a; Thøgersen 1996). Another dimension of morality in the environmental domain is that other people might be indirectly harmed, either at the same point of time or in the future, if natural ecosystems are damaged. Klöckner (2013a) proposed a continuum to classify the elements of moral considerations underlying the decision to behave pro-environmentally. On the one hand, moral motivations vary a lot with respect to their specificity, in the sense that at one extreme there are stable basic value orientations, and at the other extreme there are specific feelings of moral obligations perceived in a certain situation. In between, there are other concepts like environmental concern, as well as different types of norms. on the other hand, these constructs differ in how they motive pro-environmental behaviours, either through extrinsic or intrinsic appeals. Figure 2 reports the continuum of potential moral motivators of environmental behaviours with respect to motivation appeal. Whereas the general and abstract motivators can be located both on the extrinsic and intrinsic appeals, depending on the level of internalization and integration in the self, norms are univocally allocated to a specific motivational source. In general, the more specific and the more intrinsic the moral motivator is, the stronger the influence on the specific pro-environmental behaviour. Nonetheless, as discussed in Section 2.2, descriptive and injunctive norms can be very powerful predictors under certain conditions. Sections

2.3.1.1, Sections 2.3.1.2 and Sections 2.3.1.3 expand the elements of moral considerations not yet addressed in the previous sections.

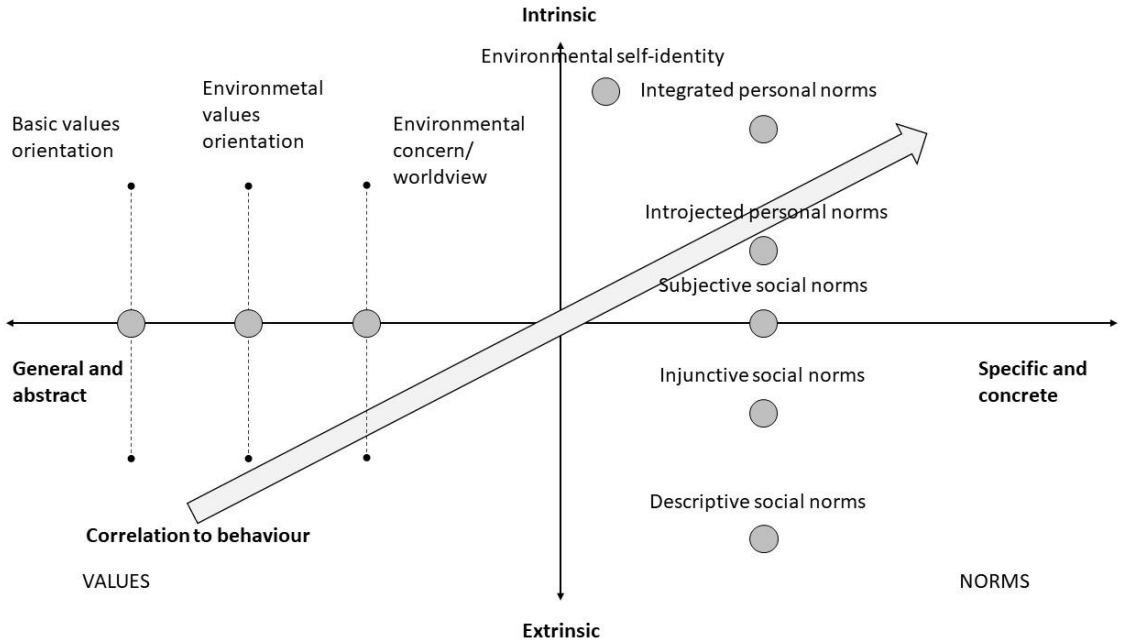

FIGURE 2. TYPES OF MORAL MOTIVATORS FOR PRO-ENVIRONMENTAL BEHAVIOURS IN A CONTINUUM DEFINED BY SPECIFICITY AND MOTIVATIONAL APPEAL (ADAPTED FROM KLOCKNER 2013a, p. 449)

2.3.1.1 VALUES

Basic value orientations are individuals' most fundamental, stable, as well as abstract representation of morality. Values have been defined by Schwartz (1994, p. 21) as "desirable transsituational goals, varying in importance, that serve as guiding principles in the life of a person or other social entity". They direct attention and influence how people judge and justify the consequences of their decisions and behaviours, thus they can motivate action. Finally, they are acquired both through socialisation to dominant group values and through unique learning experience of individuals. Values can be seen as conscious goals, which answer to universal requirements with which all individuals and societies must cope: biological and basic needs, social interaction and requisites for survival and smooth functioning of the groups. Schwartz and Bilsky (1990) empirically developed a value system based on international surveys, in order to understand the general guiding principles of people's lives. They identified ten value types: power, achievement, hedonism, stimulation, self-direction, universalism, benevolence, tradition, conformity and

security. Then, these values are grouped in four higher-order value orientations: self-enhancement, self-transcendence, openness to change and conservation. In general, people endorse all the values to some extent, but they prioritize them differently, with a resulting difference in terms of their perceptions, preferences and behaviours (Steg 2016). There are some value orientations more relevant to understand environmental behaviours: many studies show that people holding self-transcendent values have a favourable attitude towards environmental beliefs and behaviours, while self-enhancement values have a negative impact on this attitude. (Karp 1996; Nordlund and Garvill 2002; Steg et al. 2014b; Stern et al. 1995). However, most of this influence was not direct but mediated by other constructs, like attitudes and personal norms. Self-transcendent values entail the acceptance of others as equals and the concern about their welfare; it also includes being concerned for the environment; it is the overarching value orientation towards universalism and benevolence. Universalism means understanding, appreciating, tolerating, and protecting the welfare of all people and for nature (Schwartz 1992); it overlaps with the concept of biospheric values, as they direct individuals' attention on the consequences of their choices for the environment and nature (Steg 2016). According to many studies, biospheric values are strongly and consistently positively related to environmental preferences, intentions and behaviours, for instance in the domain of climate change policies acceptability, sustainable consumption, environmental activism, pro-environmental behaviour, preferences for restaurants serving organic food and donating money to an environmental rather than humanitarian organisation. Benevolence is defined as the preservation and enhancement of the welfare of people with whom one is in frequent personal contact (Schwartz 1992); it is strictly related with altruistic values, which lead people to focus on how to benefit others (Steg 2016). In particular, universalism and biospheric values motivate people to protect the nature because it is valuable in itself, while altruistic values motivate action because protecting the environment benefits other humans (Stern 2000; Stern and Dietz 1994). Therefore, biospheric values are more strongly related to pro-environmental attitudes and behaviours compared to altruistic ones; indeed, altruistic values can inhibit pro-environmental behaviours if their consequences are perceived negative for the well-being of others (De Groot and Steg 2008). Self-

enhancement values lead to focus on one's own relative success, and dominance over the others; it is the overarching value orientation for hedonism, power and achievement. Hedonism is defined as the pleasure and sensuous gratification for oneself, power consists in seeking social status and prestige, control or dominance over people and resources, and achievement entails personal success obtained by demonstrating competence according to social standards (Schwartz 1992).

2.3.1.2 Environmental concern and worldview

There are many theoretical concepts under the umbrella of "environmental concern", which are placed somewhere between basic values and very specific moral obligations (Klöckner 2013a). They contain beliefs about the world functions, the causal mechanisms and how the different pieces of the world should go together; therefore, they somehow affect what is perceived to be correct and moral. The most prominent measurement of the ecological worldview is the New Environmental Paradigm: the original 12-item scale was introduced by Dunlap and van Liere (1978), and included three subdimensions, limits to growth, balance of nature, and anthropocentrism. The first element assesses one's recognition that the potential to economic and population growth is limited; the second the recognition of the delicate equilibrium in nature; and the third is a negative loading factor which measures whether a person believes that humankind has the right to dominate nature. Many new versions have been developed, varying both the number of elements and the Likert scale. Yet, over time, variations in how the New Environmental Paradigm is measured have affected the accuracy and comparability of results, leading to a non-equivalence of the different scales. A literature review performed by Hawcroft and Milfont (2010) shows that the revised 15-item scale is the most commonly used in the literature. This version was developed by Dunlap and colleagues (2000) and added two facets to the 12-items scale: exemptionalism, which is the idea that humans are exempt from the constraints of nature, and the possibility of an ecocrisis. Since its initial publication, the different versions of the scale have been widely adopted; empirical evidence demonstrated that the environmental worldview strongly correlated with several types of environmental behaviours (Davis et al. 2009; Tarrant and Cordell 1997). Whereas some studies found this correlation between New Environmental Paradigm and pro-

environmental behaviours, the relationship is comparatively lower than other constructs, like personal norms (Scott and Willits 1994; Wiidegren 1998). Therefore, it is more likely to be an indirect predictor of pro-environmental behaviours rather than a direct one.

2.3.1.3 Personal norms and environmental self-identity

Since personal norms reflect what an individual feels morally obliged to do, they partially overlap with the concept of "moral self": they are a central element for the definition of one's moral self-identity -and, subsequently, also on one's environmental self-identity (Blasi 1980, 1983; Klöckner 2013a). Nonetheless, this line of reasoning is more relevant for integrated norms, as they are a source of internal motivation to comply with own value system and moral identity (Klöckner 2013a). Self-identity is defined as the label that one uses to describe her- or himself (Cook et al. 2002). Specifically, environmental self-identity refers to the extent to which people see themselves as individuals who carry out specific environmental behaviours (Van der Weff et al. 2014a). It prescribes a code of conduct that is consistent with the perception of one's identity, and thus promotes pro-environmental behaviours (Clayton and Opotow 2003). Like personal norms, environmental self-identity is strengthened by biospheric and self-transcendent values (Van der Werff et al. 2013a; Verplanken and Hollan 2002; Whitmarsh and O'Neill 2010), and it is an important predictor of pro-environmental behaviours (e.g., Gatersleben et al. 2012; Van der Werff et al. 2013b, 2014a; Whitmarsh and O'Neill 2010). Recent studies suggest that the environmental self-identity works at different levels of specificity: not only specific self-identities predict particular behaviours -for instance recycling self-identity (Nigbur et al. 2010), environmental activism self-identity (Fielding et al. 2008)-; but also, more general environmental self-identities exist, and they are a determinant of a wide range of environmental behaviours, -like green, eco and environmental self-identity for eco-shopping, waste reduction, domestic energy conservation, water savings, not flying on holidays (Gatersleben et al. 2014; Whitmarsh and O'Neill 2010). In order to be consistent with their self-concept, people are motivated to act in line with their self-identity in many different situations (Steg 2016). Hence, strong biospheric and self- transcendent values strengthen one's environmental self-identity, which in turn reinforces the feeling of moral

obligation to behave pro-environmentally, which works as a direct determinant to the final decision to behave morally (Van der Werff et al. 2013b).

2.3.1.4 ENVIRONMENTAL PSYCHOLOGY THEORIES

Stemming from the individual instances of moral motivators, environmental psychology has developed many theories to explain pro-environmental behaviours and provide a basis for successful behavioural change. A literature review performed by Sopha (2011) identified as the most common environmental psychology theories the Theory of Planned Behaviour (Ajzen 1991), the Norm Activation Theory (Schwartz and Howard 1981), and the Value-Belief-Norm Theory (Stern 2000). The author found that the three theories are used in more than 80% of the reviewed studies: 39% used the Theory of Planned Behaviour, 15% the Norm Activation Theory, 15% the Value Belief Norm Theory, and 13% a combination of the last two theories. Although the Theory of Planned Behaviour has received strong empirical support also in the domain of pro-environmental choices (e.g., Han et al. 2010; Harland et al. 1999; Heath and Gifford 2002; Tonglet et al. 2004), it is a general model of deliberate behaviour and is not specific on moral and ethical conducts (Sopha and Klöckner 2011). In fact, this framework it is mainly adopted in contexts where environmental behaviours are considered primarily moved by self-interest drivers (Masod et al. 2016), as it is based on the assumption that individuals decide to engage in environmentally responsible conducts after a mere cost-benefits analysis (Klöckner 2013a). Notwithstanding, this line of reasoning does not take into consideration the advancements performed by social, psychological and behavioural sciences in the analysis of individuals' behaviours and decision-making processes. Given this serious limitation, the Theory of Planned Behaviour is not adopted in this work. In contrast to the Theory of Planned Behaviour, the Norm Activation Theory focuses strongly on moral drivers of pro-environmental behaviour. Indeed, it has been developed to predict one specific type of behaviour, specifically altruistic and helping one (Klöckner 2013b). The reasons to engage in pro-environmental behaviours are consistent with the drivers leading to pro-social conducts, as both require that individuals perform moral considerations before engaging in these behaviours (Heberlein 1972; Klöckner 2013a; Thøgersen 1996). Likewise, the Value-Belief-Norm builds on the Norm Activation Theory and expands it, specifically to

predict environmental significant behaviours (Stern 2000). Therefore, given its ability to comprehend the several aspects of the decision-making and to consider the moral dimension in the choice to behave pro-environmentally, the Value-Belief-Norm Theory is analysed and applied in the context of this research. A further valuable element of this framework is the central role of personal norms as direct determinant to engage in environmentally-friendly conducts. Parallelly, a more recent wealth of literature developed a theory to predict pro-environmental behaviours stemming from environmental self-identity. Besides Norm Activation Theory and Value-Belief-Norm Theory, this latter theory is focused on the moral determinants of pro-environmental conducts; however, it proposes a simpler mechanism to ground environmental policies and social marketing programs.

2.3.1.4.1 NORM ACTIVATION THEORY

Since the Value-Belief-Norm Theory finds its roots in the Norm Activation Theory, also this latter framework is explained to better comprehend the former. The Norm Activation Theory focuses on the process of how feelings of moral obligations are activated and then, under which conditions they translate into behaviour. It was initially developed by Schwartz (1977) and Schwartz and Howard (1981) to explain altruistic behaviours; however, the original version of the theory was never formalised and several versions of it can be found in the literature, also applied to environmental behaviours (Klöckner 2013a). All interpretations of the model start from a similar set of variables and assumptions: the direct determinant of pro-environmental behaviours is personal norm, a feeling of moral obligation to behave morally. However, consistently with the Focus Theory of Normative Conduct (Cialdini et al. 1990, 1991), personal norms need to be activated to become a relevant antecedent and a strong predictor of behaviour. The most frequent set of variables considered in the literature (Klöckner 2013a, 2013b) leading to the activation of personal norms are the following:

1. Awareness of the need: the individual needs to be aware that an environmental problem exists and a solution is needed
2. Awareness of the consequences: the individual needs to be aware of the consequences that the examined behaviour would have for the environment

3. Ascription of responsibility: the individual has to accept responsibilities for negative consequences when not acting environmentally-friendly
4. Perceived behavioural control: the individual needs to perceive him or herself as able to perform the specific pro-environmental behaviour
5. Subjective norms: perceived expectations of relevant other people regarding which behavioural alternative should be performed.

Thus, when the conditions are met, personal norms are activated and the actor perceives a feeling of moral obligation to behave morally; this, in turn, is reflected in the decision to engage in the relevant behaviour.

Figure 3 represents a synthetic representation of the Norm Activation Theory.

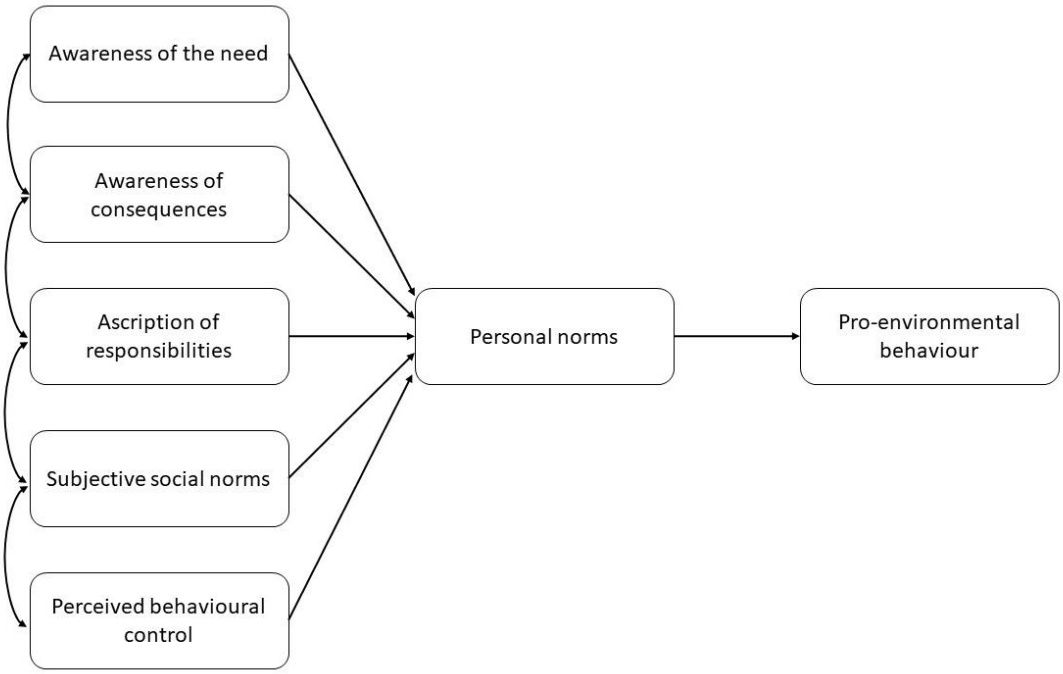

FIGURE 3. NORM ACTIVATION THEORY (ADAPTED FROM KLÖCKNER 2013a p. 460)

2.3.1.4.2 VALUE-BELIEF-NORM THEORY

The value-belief-norm is an integrative theory by nature, as it works as a connection among the general values, environmental beliefs and behaviours (Klöckner 2013b). It is a framework to systematically structure the hierarchy of elements impacting environmentally-friendly behaviours. Variables are lined up in a linear chain starting from

rather general values to finish with concrete behaviours, with intermediate activating steps. According to Stern (2000), "the causal chain moves from relatively stable, central elements of personality and belief structure to more focused beliefs about human-environment relations (New Environmental Paradigm), their consequences, and the individual's responsibility for taking corrective action. We postulate that each variable in the chain directly affects the next and may also directly affect variables farther down the chain." At the beginning of the causal chain there is a rather stable general value orientation. The impact of values on the next intermediate step of the causal chain varies depending on their nature: biospheric and self-transcendent values increase the likelihood that one holds an ecological worldview, while self-enhancement values have a negative impact on it (Klöckner 2013b; Steg 2016; Stern 2000). The New Environmental Paradigm allows to estimate one's beliefs about the adverse consequences of environmental changes. Thus, given the ecological worldview, adverse consequences for a relevant object may be perceived or anticipated. The consequences able to activate personal norms are those which impact whatever the individual values. Therefore, if an individual values the nature and the well-being of other species, he or she will be concerned about environmental conditions which threaten them. Instead, if an individual holds altruistic values, he or she will be worried about environmental conditions threatening other people's health and welfare. In the following mediating step, the individual appraises her or his personal ability to reduce these threats, and if it leads to a positive outcome, personal norms are activated. Therefore, acting pro-environmentally becomes part of the moral identity. Finally, feelings of moral obligation are a direct determinant of the decision to engage in a pro-environmental behaviour.

Figure 4 reports a graphical representation of the Value-Belief-Norm Theory.

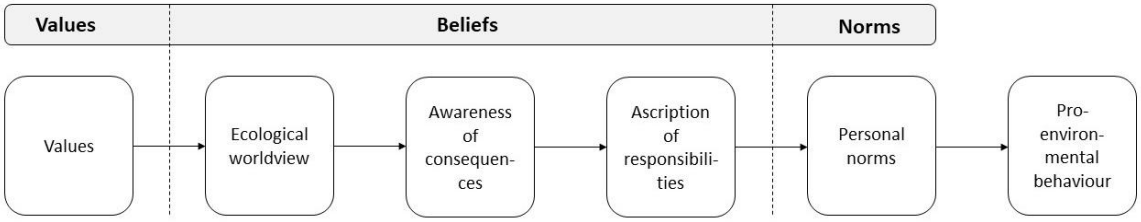

FIGURE 4. VALUE-BELIEF-NORM THEORY (ADAPTED FROM STERN 2000 p. 412)

2.3.1.4.3 ENVIRONMENTAL SELF-IDENTITY

The theory was developed by Van der Werff et al. (2014a), and it is based on the central assumption that environmental self-identity derives from two elements. On the one hand, it has a stable core influenced by biospheric and self-transcendent values, which affects a wide set of pro-environmental behaviours both in the present and in the future. On the other hand, it is susceptible to change, as it also depends on past behaviours to some extent. Specifically, the more often individuals acted environmentally friendly in the past, the more likely they will perceive themselves as environmentally-friendly people. A possible explanation of this mechanism can be found in the Self-Perception Theory, which states that "individuals come to know their own internal states by inferring them from observations of their own overt behaviour" (Bem 1972, p. 2). The effect of past-behaviours on one's environmental self-identity does not depend on one's biospheric values. Consequently, it is possible to strengthen, and somehow activate, environmental self-identity by reminding people of their past environmental behaviours. Finally, the stronger the environmental self-identity, the higher the engagement in a wide range of pro-environmental behaviours.

Figure 5 reports a representation of the theory based on environmental self-identity.

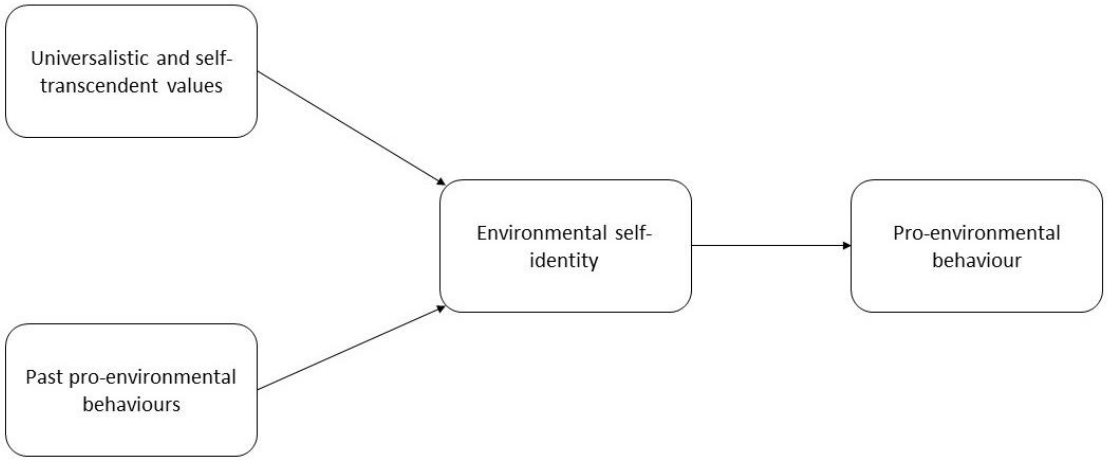

FIGURE 5. ENVIRONMENTAL SELF-IDENTITY MODEL (ADAPTED FROM VAN DER WERFF ET AL. 2014a p. 628)

2.3.2 CASE STUDIES ANALYSIS AND RELEVANT FINDINGS

Given the simple but powerful tool made available by the manipulation of environmental self-identity, the review addresses only interventions targeting it. An additional element leading to this focus is that, in the environmental literature, fewer experiments targeted personal norms compared to self-identity. Indeed, even though personal norms are an important predictor of moral conducts, there is a lack of studies focusing on how to manipulate the saliency of personal norms (De Groot et al. 2013). Thus, the rational is to work to strengthen environmental self-identity, to influence the selection of the behavioural alternative to pro-environmental practices. When designing interventions based on the manipulation of the environmental self-identity, practitioners should pay attention to avoid negative spillover effects and push positive ones. In fact, as explained later in this section, on the one hand empirical evidence shows that individuals are more likely to behave pro-environmentally if they are reminded of a range of pro-environmental behaviours they often perform (Cornelissen et al. 2008; Van der Werff et al. 2014a). On the other hand, in some cases, past-pro-environmental behaviours did not lead to more pro-environmental conducts, or even decrease them (Thøgersen and Ölander 2003). This suggests that past pro-environmental behaviours can either inhibit (negative spillover) or promote (positive spillover) future pro-environmental actions. Regarding the negative spillover effects, they may be explained by different behavioural mechanisms. A first mechanism is single action bias, which refers to the situation when an individual perceive

that a risk is reduced after a single ameliorative action is taken, even in cases where multiple actions would be more beneficial or when the initial behaviour is not the most effective (Weber 1997). Therefore, complementary or superior problem-solving strategies are disregarded, whether they deal with spillover effects among pro-environmental behaviours or from private actions to policy support. The causes of this phenomenon may be attributed to the fact that an individual, once engaged in a single behaviour to tackle an issue, perceives a decreased urgency and necessity to adopt following risk reduction strategies (Weber 2006). Another possible mechanism is the moral licensing effect (Zhong et al. 2009). Individuals experience an enhanced sense of morality when adopting what is commonly perceived as a moral or ethical action, while they perceive a comprised self-image if they engaged in an ethically dubious conduct. The moral licensing effect causes that, to balance the perceived self-image, individuals are more likely to engage in moral behaviours when the moral self-image is threatened, rather than when it is heightened by a recent moral action (Truelove et al. 2014). Other streams of literature explain moral licensing effect in terms of "contribution ethic" (Kahneman et al. 1993; Thøgersen and Crompton 2009): if a person perceives she or he has already contributed with her or his fair share to the common good, through the recent moral action, the individual will fell justified in passing up a new opportunity to engage in a pro-environmental behaviour. Positive spillover effects are underlay mainly by consistency effects. Firstly, they are motivated by social reasons, as they encourage people to act coherently with their public image to present a consistent image of themselves to others (Abrahamse et al. 2005; Cialdini 2001; Maslow 1968; Suh 2002). They motivate persistent moral conducts as they answer individuals' desire to project a positive, moral, and consistent image to others. However, consistency commitments work also in anonymous or private contexts (Kerr and Kaufman-Gilliland 1994). This leads to the second category of consistency effects, which refer to self-identity and moral concept. In fact, cueing individuals about the positive environmental outcomes of their behaviours leads to strengthen their environmental self-identity, and to the activation of corresponding rules of conducts (Cornelissen et al. 2008). Finally, there are identity effects of an individual with a group or category of people (Truelove et al. 2014). In fact, if a social identity -like environmentalists- is made salient, individuals feel a

moral obligation to act in line with it (Stürmer et al. 2003), and consequently increase their engagement in pro-environmental behaviours (De Groot and Steg 2008; Joireman et al. 2010; Whitmarsh and O'Neill 2010).

The first lab experiment exploring how to manipulate of the self-identity was conducted by Cornelissen et al. (2008), in Belgium. The treatment consisted in asking participants to report the frequency in which they engaged in past pro-environmental behaviours. However, the authors argued that the behaviours selected for the treatment should meet some requirements, since the extent to which environmental self-identity is influenced by past actions depends on the signalling strength of the specific behaviour. Specifically, two behavioural heuristics are likely to affect the outcome of the treatment. The first is the representativeness heuristics (Kahneman and Tversky 1972), which states that individuals evaluate probabilities based on the similarity between a recalled event and an internalized representation or prototype of that event. Thus, the behaviour needs to be representative of the ecological category to be considered as diagnostic of the environmental self-perception. Pro-environmental behaviours are more likely to be representative of ecological category if they exhibit some features. According to Kelley's Attribution Theory (1973) they should have low frequency of occurrence in the population -e.g., not flying on holiday-, otherwise they may be taken for granted and prove less diagnosticity of an environmental disposition. Secondly, if the decision to engage in a pro-environmental behaviour can be attributed to more motivations -e.g., economic savings, health concerns- than simply the environmental one, the target behaviour will be perceived less representative of the ecological category (Cornelissen et al. 2008). For these reasons, a large number of environmentally-friendly behaviours may be judged non-representative, and hence non-diagnostic for the inference of the ecological identity. The second heuristic is the availability one (Tversky and Kahneman 1973), namely assessing the probability of an event by the ease with which instances of that event come to mind. Subsequently, the easier it is to come up with examples of own past pro-environmental behaviours, the more pro-environmental the self-perception will be. Therefore, Cornelissen and colleagues (2008, Study 2 and Study 3) designed two experimental treatments to investigate the practical implications of the two heuristics. They assigned participants either to an

environmentally-friendly condition, where the subjects were asked to report the frequency in which they engaged in common past pro-environmental behaviours -high availability but low representatives-, or to an environmentally unfriendly group, who was asked to report the frequency of less common pro-environmental behaviours -low availability while high representativeness. In order to tackle the low representativeness of the first group, the authors positively cued common pro-environmental behaviours -i.e. labelled them as pro-environmental-, to motivate the target to reinterpret them as diagnostic of environmental attitudes. In fact, by emphasizing the environmental nature of behaviours commonly engaged in, the subject will infer own pro-environmental attitude, and therefore will see her or himself as a person who usually behaves in an ecological way (Albarracin and Wyer 2000). In Study 2 they found that the environmentally friendly group resulted to have a higher environmental self-identity, while the environmental unfriendly group and the control condition did not significantly differ. In Study 3, they also investigated the impact of environmental self-identity on the decision to engage in following pro-environmental behaviours: results show that participants who were asked to report the frequency of common pro-environmental behaviours acted more environmentally-friendly in following tasks (like buying a more expensive but sustainable product, and choosing a less attractive but recycled notepad) compared to participants in the environmentally-unfriendly group. Instead, there was mixed evidence between the environmentally unfriendly group and the control condition: they did not significantly differ in the following behaviours, except in one out of three dependent variables, where the control group actually engaged in more pro-environmental behaviours. Successive lab experiments led to similar patterns of behaviour. Van der Werff et al. (2013a, Study 3) replicated the same experiment in the Netherlands, and achieved results aligned with Cornelissen and colleagues (2008): the environmentally-friendly group had a strengthened environmental self-identity, while the other two groups did not significantly differ. Notwithstanding, there was not a significant direct effect of environmental self-identity on the reported willingness to engage in following pro-environmental behaviours. The experiment was again replicated by Van der Werff and colleagues (2014a) in Netherlands. In Study 3 the authors found that the environmentally-friendly and the control groups did not differ in terms of self-identity, while the

environmentally unfriendly group exhibited a significant lower value. Moreover, even though they did not find any direct effect of the self-identity manipulation on the dependent measures, the self-identity significantly mediated the relationship between the manipulation and the self-reported willingness to engage in pro-environmental behaviours. Instead, in Study 4, their manipulation led the environmentally-friendly group to choose more environmental alternatives (self-reported variables), while the other two groups did not differ significantly. A final experiment by Van der Werff and colleagues (2014b) further investigated under which circumstances a pro-environmental behaviour has stronger signalling power, by varying the level of uniqueness and of difficulty of the pro-environmental behaviours selected for the self-identity manipulation (Study 2). Nevertheless, they did not find any significant differences in participants' environmental self-identity, neither on following pro-environmental behaviours, comparing the strong signalling features condition (unique and difficult behaviour) with the low signalling features group (not unique and easy behaviour).

A concluding remark about these experiments is that the authors successfully managed to avoid negative spillover effects in the environmentally-friendly condition. This may be explained by the signalling strength of the pro-environmental behaviours: indeed, if the previous actions signal participants' environmental self-identity weakly, their following behaviours would show a licensing effect (Mullen and Monin 2016; Van der Werff et al. 2014b). Therefore, the authors probably managed to strengthen environmental self-identity enough, and thus created consistency effects in participants' mind with own moral concept.

2.3.3 Design of interventions based on environmental self-identity

The review of the experimental studies presented in Section 2.3.3 shows that the extent to which past pro-environmental behaviours will promote future environmentally responsible actions depends on the signalling strength of the selected behaviours, and the frame adopted to propose them.

1. *Simple and common behaviours:* individuals, in order to infer their environmental self-identity, need to realize that they often perform pro-environmental behaviours.
2. *Positively cueing:* labelling common and simple behaviours as "environmental" increases their diagnosticity and their representativeness of the ecological category, and results in more environmentally friendly self-identity.

2.4 GAPS EMERGING FROM THE LITERATURE AND RESEARCH QUESTIONS

The literature review highlights some criticalities, as well as evidences some key questions left unanswered by the scientific community. The general topic in need of further investigation concerns the interaction between normative interventions and personal background, in terms of personal norm and environmental self-identity. Indeed, it is still under-investigated the moderating role of personal norms between normative influence and the decision to engage in pro-environmental behaviours. Even though empirical evidence shows that normative interventions are less effective on individuals who perform better than the average, extant literature did not investigate if this is caused by the presence of strong personal beliefs and norms regarding the specific situation. In fact, the case studies reported in Section 2.2.2 demonstrated that normative influence achieved greater results to increase the level of pro-environmental behaviours compared to other motivational drivers, such as financial savings, and pro-environmental and pro-social motivations. Notwithstanding, the reasons leading to this outcome, such as the fact that normative interventions are an incentive also for those people who do not have other reasons to behave pro-environmentally, were only supposed and not empirically tested (Nolan et al. 2008). Only a preliminary study conducted by Göckeritz and colleagues (2010) partially contributed to fill this literature gap, showing that normative social influence is lower among individuals who already hold personal norms about the specific behaviour. However, the study investigated the moderating role of personal norms between perceptions and beliefs of social norms on self-reported behaviours, rather than how the strength of personal norms influences the impact of social norms activation when the relevant choice is made. This study provides some advancements in two main ways: the natural large-scale intervention and the online experiment represent robust ways to

investigate the relative importance of the personal and social motivational drivers. Furthermore, aligned with the general research topic, the two empirical steps address specific research questions individually. An additional contribution of the thesis is to test these hypotheses in new contexts: in particular, the field experiment represents to the best of our knowledge the first of its kind experiment in the Italian context.

There is a stream of literature stating that personal norms are less important in the decision to engage in effortful, financially demanding, and time consuming pro-environmental behaviours, like energy savings actions (Abrahamse and Steg 2011; Harland et al. 1999; Ortega-Egea et al. 2014; Steg et al. 2014b; Stern 2000; Vanderberg 2005). On the contrary, there are other studies finding that personal norms remain a central determinant in the decision-making process even when the behaviour meets these characteristics (Black et al. 1985; Schultz and Oskamp 1996; Van der Werff and Steg 2015). Therefore, through the intervention proposed by the two large multinational companies (Chapter 3), the work contributes to this debate, by investigating the impact of personal norms on actual household energy consumption. Secondly, the first step allows to understand the impact of normative intervention in the Italian context. Indeed, the literature review proposed by Fischer (2007) demonstrates that there are national and cultural differences in preferences and in potential outcomes of normative interventions, leading to non-transferrable results from other countries to a specific national situation. This worsens the issue of lack of information about some countries; as far as Italy is concerned, the impact of similar interventions has barely been investigated. One similar experiment was proposed by the Regulatory Authority for Electricity, Gas and Water (Autorità per l'energia elettrica, il gas ed il Sistema idrico, AEEGSI) in collaboration with University of Siena in 2015. Even though the intervention is described in the report "Behavioural Insight and Public Policy" (OCED 2017), no information is available in the academic literature. Through a lab experiment, they tested how participants (300 students) reacted to different types of feedbacks so as to improve energy efficiency; among the tested interventions, one aimed at testing the influence of information about other participants performance -namely, social norms. They found a significant impact of normative information on participants, with a positive or negative outcome depending on the selected benchmark: if the feedback provided

information about a benchmark performer who was inefficient, the participant was not motivated to improve his or her behaviour. Since the experiment was performed in the laboratory context with Italian students, results might not be generalisable. Finally, the first step addresses the lack of empirical studies investigating the impact of prolonged exposure to normative information on personal norms. In fact, extant studies deepened the influence of subjective social norms on personal norms (Doran and Larsen 2016; Thøgersen 2006, 2009), rather than investigated whether the provision of descriptive and injunctive norms actually strengths -introjected- personal norms.

As far as the latter empirical step (Chapter 4) is concerned, it replicates the experiment of manipulating the environmental self-identity and the corresponding impact on the decision to behave pro-environmentally. Indeed, the results described in Section 2.3.2 indicate some methodological issues in past experiments: participants were undergraduate students (Cornelissen et al. 2008; Van der Werff et al. 2013a, 2014a, 2014b), 3 out of 4 studies were performed in Netherlands and measured pro-environmental behaviours with self-reported measures, rather than actual decisions (Van der Werff et al. 2013a, 2014a, 2014b); finally, they mainly achieve consistent outcomes, but evidence is still mixed. Therefore, the replication of the treatment provides new data to verify whether it is actually effective. Moreover, given the striking number of successful interventions based on social norms and on environmental self-identity, the latter empirical step aims at combining the effects of these two treatments, with the objective of maximising the number of individuals persuaded to engage in pro-environmental behaviours. In fact, the two interventions leverage on different mechanisms, and affect the decision-making process in different ways, depending on the initial personal background: normative social influence is higher and positive in case the target does not already exhibit the environmentally-friendly behaviour (Schultz et al. 2007), and probably does not hold personal norms (Göckeritz et al. 2010); while to effectively activate and infer an environmental identity stemming from the engagement in a specific pro-environmental behaviour, the person needs to have a sufficient strong ecological disposition and pro-environmental habits (Thøgersen and Crompton 2009). In the literature, there is a lack of empirical studies investigating the potential derived from the integration of these two

mechanisms: only De Groot and colleagues (2013) performed a similar experiment to reduce the usage of plastic bags in supermarkets in UK. Customers of the supermarket were either exposed to an injunctive normative message ("Shoppers in this store believe that re-using shopping bags is a worthwhile way to help the environment. Reuse your bags."), or to a personal normative message ("We thank you for helping the environment by continuing to reuse your bags"), or a combination of the two messages to convey both the pieces of information. Results showed that the treatments significantly reduced the usage of free plastic bags compared to the control condition -i.e., the traditional message. However, this effect was lower for the personal normative message compared to the injunctive information. Moreover, the combined message led to the lowest usage of plastic bags, but it did not differ significantly to individual treatments. Although they did not find any significant improvement from the integration of the two treatments, the authors could only hypothesise the reasons leading to this outcome, as it was performed in a real context, and there was not the possibility to control for the impact of the messages. Therefore, the proposed experiment has the objective of integrating the two mechanisms to create a unique, more effective communication strategy, targeting all the individuals regardless their personal background.

This chapter outlined relevant gaps in the literature; stemming from them, some hypotheses on how findings will contribute to propose some advancements have been developed. They constituted the basis for the design of the two empirical steps; hence, they are presented and discussed in the specific chapters.

3 STUDY 1: FIELD EXPERIMENT

In Study 1 the different effects, both in terms of behavioural change and of environmental beliefs and norms, derived from the prolonged exposure to normative information were investigated. Besides, the intervention focused on the sources of heterogeneity on treatment effectiveness, and the interactions between the treatment and the different elements of the environmental disposition. Hence, the hypotheses tested are the following.

H1: *Personal norms are a central determinant of pro-environmental behaviours even when these exhibit high situational and personal costs.*

H2: *Social normative influence is less effective in those individuals already exhibiting environmental disposition and norms, since they are already intrinsically motivated to act pro-environmental.*

H3: *Interventions based on normative social influence work in the Italian framework.*

H4: *By exposing individuals to social norms over a substantial period of time, it is possible to influence their subjective social norms. In turn, subjective social norms influence personal norms.*

The investigation was performed through the development and the implementation of a survey, reporting the relevant questions to collect the data required to test the specific hypotheses.

3.1 NORMATIVE INTERVENTION: EXPERIMENTAL DESIGN AND OVERVIEW

The campaign is proposed by two large multinational enterprises to the Italian customer base. It is aligned with the increasing attention of scientific communities, as well as private and public bodies, to non-monetary incentives applied to the context of energy consumption reduction. With 35% contribution to global GHG emissions (IPCC 2014b), energy production and consumption is the most relevant sector to tackle climate change. Behaviour, lifestyle and culture have a considerable effect on direct and indirect energy use, with high mitigation potential in many sectors: indeed, emissions can be substantially reduced through changes in consumption patterns, like adopting energy saving measures

and dietary changes (IPCC 2014a). Therefore, in the context of interventions tackling GHG emissions from the energy sector, increasing attention is provided to behavioural intervention acting on the demand side (Alcott 2011). Within this framework, Opower, in collaboration with international utilities, runs one of the most notable non-price program to encourage household energy saving (see Section 2.2.2). Results are surprising: during the program, there is an average energy savings between 1.1% and 3% (Allcott 2011; Ayres et al. 2012; DNV GL 2015); then, 2-4 years after the end of the program, the effect is still significant (Allcott and Rogers 2014; DNV GL 2015). The Italian intervention where Study 1 took place exhibits the same key features of Opower program.

The design of Opower intervention was directly influenced both by the scientific literature about the positive and substantial influence of normative interventions in inducing households to save energy (Nolan et al. 2008; Schultz et al. 2007), but also by the broader stream of research of successful social-norms campaigns across diverse domains, like voting, retirement savings, and charitable giving (Beshears et al. 2009; Frey and Meier 2004; Gerber and Rogers 2009). The central mechanism underlying the program is social comparison: through the home energy report (HER), the recipient is exposed to a comparison of her or his own household energy consumption to that of similar neighbours. Specifically, the HER is composed by two key components: the Social Comparison Module and the Action Step Module. The Social Comparison Module is sent by email and provides normative information. It displays the descriptive norm, where the household is informed about its consumption level, compared to the average consumption of similar neighbours, and to the consumption of the 20% most efficient houses among the same pool of similar neighbours. The household's comparison group comprises around 100 geographically-proximate houses exhibiting similar characteristics. In order to prevent the potential "boomerang effect", which causes households initially consuming less than the average increase their consumption level, the information provided by the descriptive norm is integrated with the injunctive one (see Section 2.2.2 and Section 2.2.3). In the context of this project, the injunctive norm is expressed in term of up thumbs integrated with sentences and tailored on household consumption:

- “Ottimo, continua così” (Great) and three thumbs up for the most efficient 20%
- “Stai andando bene” (Good) and two thumbs up for those households between top 20% and 50%
- “Puoi fare meglio” (Below the average) and one thumb up for those below the 50%.

The email displaying the Social Comparison Module proposes also a link to access the Action Step Model and read information specific of the household energy profile. The module provides energy conservation tips, including both changes to the energy-using devices and to the use of that capital stock, which are tailored on the target house, considering the historical energy use, infrastructural features, as well as demographic characteristics. Finally, in order to monitor variations in household energy consumption, the companies read customers’ meters monthly.

The project started in June 2016 and is planned to run for 24 months. Customers were initially inspected to verify whether they met specific technical requirements, both in terms of geographical site and customer profile, needed to participate the project. Among all those eligible as of June 2016 (500,000 customers), the sample was randomly assigned to a treatment group (90%), to be emailed with the HER, or a control group, which does not receive it. Reports are sent bimonthly; within the treatment, a group receive HER during odd months, the other during even. Over the months, ongoing new customers could ask to enrol in the program; around 40,000 new clients have joined the program every month.

3.2 Method

3.2.1 Participants and procedure

The survey was distributed by email all around Italy. Recipients were randomly selected from program treatment and control groups; participants received the survey on the 12th of April and had two weeks to complete it. In total, 3027 respondents completed the survey (response rate of 97%). Each participant received an Amazon bonus of 3 € for the completion of the survey. In addition to the measures described in this work, the questionnaire comprised questions on energy literacy, personality, social identity and social capital (Appendix 1 reports the entire survey in the original language). The sample was heterogeneous: detailed characteristics are displayed in Table 1. Some baseline

variables were not balanced among the two groups, and this may have biased statistical analysis, as observed differences in outcome between experimental groups could by chance be due to characteristics of the participants, not to treatments (Roberts and Torgers 1999). Regarding the gender, there were more women responding to the survey in the treatment group then the control condition. Then, the control group was characterised by a higher percentage of individuals with an average income comprise between 3,000 and 5,000 €. Finally, two areas of residence were not balanced: treatment group exhibited a lower number of respondents living in the North West, as well as a higher percentage living in Islands. Nonetheless, results were robust to demographic controls (see Section 3.2.3).

TABLE 1. DEMOGRAPHIC CHARACTERISTICS OF SURVEY RESPONDENTS

Variables	Treatment			Control			
	Observations	Mean	SD	Observations	Mean	SD	P-value[1]
Gender (percentage female)	2453	0.316	0.465	574	0.275	0.447	0.052
Age	2453	52.655	13.295	574	53.272	12.810	0.303
Schooling: primary	2453	0.009	0.096	574	0.009	0.093	0.881
Schooling: secondary	2453	0.116	0.321	574	0.122	0.328	0.699
Schooling: high school	2453	0.524	0.500	574	0.538	0.499	0.543
Schooling: undergraduate	2453	0.295	0.456	574	0.280	0.450	0.487
Schooling: Master or PhD	2453	0.055	0.228	574	0.051	0.219	0.667
Income: less than 500 €	2010	0.019	0.136	478	0.027	0.163	0.250
Income: between 500 and 1,000 €	2010	0.062	0.242	478	0.046	0.210	0.178
Household income: between 1,000 and 2,000 €	2010	0.293	0.455	478	0.262	0.440	0.178
Household income: between 2,000 and 3,000 €	2010	0.259	0.438	478	0.285	0.452	0.259
Household income: between 3,000 and 5,000 €	2010	0.198	0.398	478	0.234	0.424	0.073
Household income: between 5,000 and 7,000 €	2010	0.044	0.206	478	0.033	0.180	0.291
Household income: between 7,000 and 10,000 €	2010	0.027	0.162	478	0.017	0.128	0.202
Household income: more than 10,000 €	2010	0.099	0.298	478	0.096	0.295	0.881
Residential area: North West	2453	0.304	0.460	574	0.368	0.483	0.003
Residential area: North East	2453	0.147	0.354	574	0.132	0.339	0.365
Residential area: Centre	2453	0.289	0.454	574	0.289	0.454	0.991
Residential area: South	2453	0.185	0.389	574	0.157	0.364	0.107
Residential area: Islands	2453	0.074	0.261	574	0.054	0.226	0.095

[1]T-TEST WITH DIFFERENT VARIANCES, TWO TAILS.

3.2.2 MEASURES

3.2.2.1 ENVIRONMENTAL DISPOSITION

The different elements of the Value-Belief-Norm were assessed. Values were measured according to European Social Survey (Davidov et al. 2008). *Environmental values* -namely, biospheric values and universalism- were measured with two items "Respecting animals and plants is important to this person; to value own welfare to the same level of other natural beings" and "Looking after the environment is important to this person; to care for nature and save life resources" (Cronbach's alpha 0.73*)*. The other values relevant to predict the environmental disposition (see Section 2.3.1.1) were measured with individual items: *benevolence* through "It is important for this person to help the people nearby; to care for their well-being", *power* with "It is important to this person to be rich; to have a lot of money and expensive things", *achievement* through "Being very successful is important to this person; to have people recognize one's achievements", and *hedonism* by "It is important to this person to have a good time; to "spoil" oneself". For each value, respondents could range from 1 ("Not at all like me") to 6 ("Very much like me").

For the other elements of the environmental background, respondents indicated to what extent they agree with the items on a 10-point scale ranging from "Totally disagree" (1) to "Totally agree" (10). *Environmental self-identity* was measured with one item "Acting pro-environmentally is an important part of who I am" (Van der Werff et al. 2013a), as well as *personal norms* "I feel morally obliged to save energy" (Van der Werff et al. 2013a), and also *subjective social norms* "Most of the people who are important to me will approve of me when I try to save energy" (Thøgersen 2006); *awareness of consequences* was measured with two items "I worry about CO2-emissions caused by energy use" and "Energy use causes serious environmental problems, such as climate change" (Cronbach's alpha 0.87) (Van der Werff and Steg 2015). Concerning ascription of responsibilities, it is hardly distinguishable from personal norms both in a theoretical and empirical perspective: some studies suggest to measure outcome efficacy rather than ascription of responsibilities (Van der Werff and Steg 2015; Hunecke et al. 2001). In line with them*, ascription of responsibilities* was measured with one item "I think I can contribute to reducing environmental problems by reducing energy use".

Finally, participants were asked about a general question related to *climate change perception*: "You may have heard the idea that the world's climate is changing due to anthropogenic greenhouse gas emissions. What is your personal opinion on this?", and the answer ranged from 1 ("Definitely false") to 4 ("Definitely true"), with two more options ("I don't know"; "I don't want to answer") (European Social Survey 2016).

3.2.2.2 DEPENDENT VARIABLES

Pro-environmental choices were measured both with self-reported and actual behaviours. For self-reported behaviours, participants were asked to report how often they engage in specific energy-savings behaviours on a scale from 1 ("Never") to 5 ("Always"). The behaviours were: wash clothes with cold water *(PEB1),* hang clothes to dry instead of using dryer *(PEB2)*, turn off the lights when leaving a room *(PEB3),* set the heating or cooling system to a different temperature when leaving home *(PEB4),* unplug electronics when not in use *(PEB5)*, and talk to other people about saving energy *(PEB6)*. Beyond the score on each item, it was added a *synthetic measure* showing whether individuals are above (1) or below (0) the average level of engagement in energy-saving behaviours. Then, depending on their score on single behaviours, respondents were either considered environmentally friendly (if they scored "Often" or "Always" on at least two behaviours) or unfriendly (otherwise). The two groups were asked to select the main motivational driver (*motivational driver environmentally-friendly group: economic, environmental, habit)* leading to or barrier *(motivational driver environmentally-unfriendly group: habit, not enough positive environmental impact to worth the effort, not enough financial savings to worth the effort*) preventing the adoption of behaviours.

Actual behaviours were evaluated from enterprises data. They provided monthly historical data about household electricity consumption, ranging from 2015 to winter 2017. Stemming from them, it was assessed the *average electricity consumption in 2016*. The selection of year 2016 was motivated by three main reasons: although the survey was performed in spring 2017, consumption data referring to the same period were not enough to proxy household consumption pattern; then, even if available, electricity consumption in year 2015 were considered too far from the implementation of the survey; besides, the

treatment did not have a significant effect on 2016 aggregate consumption ($F(1, 2930) = 0.219$, $p= 0.64$), allowing to perform an analysis unaltered by treatment effects. Moreover, the dependent measures *top 20%* and *level of engagement* were measured. The dummy variable *top 20%* indicates whether the household was in the most efficient 20% in the household comparison group in February 2017 (*top 20%*= 1; 0 otherwise). *Level of engagement* measures customer's engagement with the reports sent between January and April 2017; it represents a mean value of all the interactions between the customer and the emails, coded as follows: 1 if the email was received but not opened, 2 if opened, 3 if the recipient clicked on the link to the personal area.

Table 2 reports an overview of respondents' answers. A preliminary examination of results shows that the treatment had an effect on self-reported pro-environmental behaviours, both in terms of aggregate measure, and of individual ones, specifically on preventing from the usage of the dryer (PEB 2) and on talking to others about energy saving (PEB 6). The treatment influenced some elements of the environmental background as well; it is worth highlighting that the elements of the environmental disposition affected by social influence were mainly those closer to the decision to behave pro-environmentally: personal norms, environmental self-identity and subjective social norms.

TABLE 2. MEAN AND STANDARD DEVIATION TO SURVEY ANSWERS

Variables	Treatment			Control			
	N	Mean	SD	N	Mean	SD	P-value[1]
Environmental values[2]	2453	0.809	0.697	574	0.767	0.763	0.266
Benevolence[2]	2453	0.552	0.819	574	0.574	0.837	0.570
Power[2]	2453	-1.667	1.071	574	-1.696	1.046	0.605
Achievement[2]	2453	-1.106	1.134	574	-1.151	1.105	0.453
Hedonism[2]	2453	-1.221	1.326	574	-1.147	1.149	0.133
Climate change perception	2389	3.537	0.600	554	3.498	0.623	0.191
Awareness of consequences	2453	7.904	2.108	574	7.807	2.108	0.408
Ascription of responsibilities	2453	7.682	2.323	574	7.662	2.296	0.722
Personal norms	2453	7.857	2.176	574	7.685	2.235	0.072
Subjective social norms	2453	7.393	2.224	574	7.117	2.364	0.018
Environmental self-identity	2453	8.137	1.989	574	7.965	2.039	0.048
PEB - synthetic measure	2453	0.507	0.500	574	0.463	0.499	0.062
PEB1	2453	3.333	1.060	574	3.289	1.081	0.424
PEB2	2453	4.549	0.938	574	4.603	0.922	0.062
PEB3	2453	4.700	0.592	574	4.688	0.618	0.814
PEB4	2453	3.626	1.565	574	3.564	1.573	0.346
PEB5	2453	2.982	1.457	574	2.933	1.483	0.478
PEB6	2453	3.165	1.021	574	3.037	0.994	0.006

Environmentally-friendly group	2453	0.966	0.180	574	0.970	0.170	0.265
Motivational driver for environmentally-friendly group: environment[3]	2370	0.116	0.320	557	0.117	0.321	0.943
Motivational driver for environmentally-friendly group: financial savings[3]	2370	0.581	0.494	557	0.555	0.497	0.267
Motivational driver for environmentally-friendly group: habit[3]	2370	0.279	0.448	557	0.303	0.460	0.257
Motivational driver for environmentally-unfriendly group: environmental benefits do not worth[3]	83	0.036	0.239	17	0	0	0.438
Motivational driver for environmentally-unfriendly group: financial benefits do not worth[3]	83	0.108	0.318	17	0.176	0.393	0.509
Motivational driver for environmentally-unfriendly group: habits[3]	83	0.687	0.467	17	0.647	0.493	0.755

[1]WILCOXON RANK SUM TEST. [2]AS SPECIFIED IN THE CODEBOOK PROVIDED AS INTEGRATION OF EUROPEAN SOCIAL SURVEY (2016b), PARAMETERS OF VARIABLES MEASURING VALUES ARE CENTRAL VALUES, COMPUTED BY SUBTRACTING THE OVERALL MEAN SCORE TO THE MEAN OF THE SPECIFIC VALUE. THEY ARE COMPUTED IN THE SAME WAY IN THE FOLLOWING ANALYSES TOO. [3]THEY ARE DUMMY VARIABLES EQUAL TO 1 IF THE SPECIFIC MOTIVATIONAL DRIVER HAS BEEN SELECTED, 0 OTHERWISE. THEY ARE MEASURED INTEGRATING THE RESULTS OF THE SELECTION FROM THE AVAILABLE CHOICE AND WHAT RESPONDENTS WROTE IN ADDITION IN THE SECTION "OTHER".

3.2.3 ANALYSIS

All the statistical analyses were made with R. The first analysis assessed the relation between environmental personal norms and the engagement in actual energy saving behaviours, which are effortful, time- and resource-consuming. The investigation was performed through regression analyses: the first regression model considered only personal norms; next, environmental disposition, demographic characteristics and house infrastructural features were added to control and reduce the effect of potential confounding variables on the relation between independent variables and outcome and to control for possible effects of unbalances among the two treatment and control groups (Freedman et al. 2007).

The successive investigation focused on the effectiveness of the treatment. An effective treatment entails twofold potential results, in terms of significant influence on behaviours, and of increase individuals' environmental background and disposition. In the current research, the environmental background and disposition were considered consistently with the Value-Belief-Norm Theory, which was tested through correlation analysis. The effectiveness of the treatment on promoting pro-environmental behaviours was examined through differences in the mean engagement in self-reported energy-savings actions, both as individual behaviours and as the synthetic measure. Also mean differences for motivational drivers were measured. The final considerations about the effectiveness of the treatment evaluated the differences between the treatment and the control group in the mean scores of the elements of the environmental disposition. Since the normality distribution assumption was not met by survey respondents, non-parametric tests on distribution were preferred. Thus, Wilcoxon rank sum test was implemented in the place of Student t-test to compare two independent samples (Lowry 2014). Also, it was studied if the impact of the treatment on personal norms is mediated by subjective social norms. As recommended in the literature (Preacher and Hayes 2008), to test mediation effects, a total of 5000 bootstrap samples, and 95% bias corrected and accelerated confidence intervals were implemented.

Next, the analysis identified the potential sources of heterogeneity in treatment effects, in terms of environmental disposition and demographic features. Thus, through regression analyses, it was investigated the relative importance of normative influence and environmental disposition, as well as their combined effect on self-reported energy saving behaviours. A further examination integrated these results by analysing, within the treatment group, if different levels of environmental background influenced the level of engagement. Finally, the interaction between the treatment and demographic features is considered both individually, and as a control for the previous regression analyses.

3.3 RESULTS

The Value-Belief-Norm Theory was tested, and the pattern of correlations demonstrate its validity (Table 3). Indeed, correlation coefficients show that all the elements of the hierarchical sequence are correlated, but the relation is stronger between adjacent elements. Moreover, personal norms appear to derive equally from ascription of responsibilities, the term preceding them in the Value-Belief-Norm Theory, and from perceived social pressure and expectations (Table 4).

Consistently with H1, personal norms significantly decrease the level of electricity consumption in 2016 (Table 5, Model 1); slightly lower but still significant results were detected for environmental self-identity (Table 5, Model 2). Regarding personal norms, evidence is even stronger when controlling for demographic and house characteristics, and environmental background (Table 5, Model 4); for this case, also hedonistic values have a significant negative impact on the dependent measure. Moreover, beyond these variables, no other elements of the Value-Belief-Norm Theory are significant predictors of the average electricity consumption -even when regressed individually (Table 5, Model 3). Nonetheless, for all the models tested, the variance of average electricity consumption explained did not go beyond 10%, concluding that key variables were probably missing from the inspection, or that the measure was too aggregate to be significantly predicted. On the contrary, no significant results were discerned when the dependent variable was being in the top 20%. Results for this measure are reported in Appendix 2.

TABLE 3. CORRELATION COEFFICIENTS AND SIGNIFICANCE (PEARSON TEST) AMONG THE ELEMENTS OF THE VALUE-BELIEF-NORM THEORY, ENVIRONMENTAL SELF-IDENTITY AND SUBJECTIVE SOCIAL NORMS (N= 3027)

	EV	Benevolence	Power	Achievement	Hedonism	CC	AC	AR	PN	SSN
Benevolence	0.143***									
Power	-0.473***	-0.349***								
Achievement	-0.455***	-0.328***	0.430***							
Hedonism	-0.397***	-0.278***	0.374***	0.254***						
CC	0.147***	0.051***	-0.099***	-0.051***	-0.085***					
AC	0.235***	0.088***	-0.155***	-0.096***	-0.165***	0.500***				
AR	0.210***	0.09***	-0.152***	-0.104***	-0.179***	0.303***	0.696***			
PN	0.226***	0.083***	-0.167***	-0.140***	-0.175***	0.204***	0.455***	0.477***		
SSN	0.106***	0.05***	-0.110***	-0.070***	-0.09***	0.126***	0.295***	0.331***	0.508***	
Self-identity	0.365***	0.081***	-0.254***	-0.175***	-0.221***	0.194***	0.474***	0.477***	0.706***	0.516***

SIGNIFICANCE: ***P < .001 **P <.01, *P<.05, † P<.1. IN THE TABLE: EV: ENVIRONMENTAL VALUES, CC: CLIMATE CHANGE PERCEPTION, AC: AWARENESS OF CONSEQUENCES, AR: ASCRIPTION OF RESPONSIBILITIES, PN: PERSONAL NORMS, SSN: SUBJECTIVE SOCIAL NORMS.

TABLE 4. REGRESSION ANALYSES WITH DEPENDENT VARIABLE: PERSONAL NORMS (N=3027)

Model	β	SE	T-value	P-value	R^2	R^2 adj
Model 1					0.258	0.258
Subjective social norms	0.494	0.0152	32.47***	0.000		
Model 2					0.228	0.228
Ascription of responsibilities	0.451	0.015	29.89***	0.000		
Model 3					0.366	0.365
Subjective social norms	0.382	0.015	25.640***	0.000		
Ascription of responsibilities	0.328	0.014	22.630***	0.000		

SIGNIFICANCE: ***P < .001 **P <.01, *P<.05, † P<.1.

TABLE 5. REGRESSION ANALYSES WITH DEPENDENT VARIABLE: AVERAGE ENERGY CONSUMPTION IN 2016 (N=2932)

Model	β	SE	T-value	P-value	R^2	R^2 adj
Model 1					0.001	0.001
Personal norms	-2.411	1.165	-2.069*	0.0386		
Model 2					0.001	0.001
Environmental self-identity	-2.459	1.279	-1.923†	0.0545		
Model 3					0.004	0.001
Personal norms	-2.140	1.366	-1.568	0.117		
Ascription of responsibilities	1.922	1.589	1.209	0.227		
Awareness of consequences	-2.028	1.740	-1.165	0.244		
Climate change perception	-0.069	0.164	-0.426	0.670		
Environmental values	-7.336	4.619	-1.588	0.112		
Benevolence	-1.175	3.503	-0.335	0.737		
Power	-1.161	2.996	-0.388	0.698		
Achievement	-3.374	2.724	-1.239	0.216		
Hedonism	1.698	2.483	0.684	0.494		
Model 4					0.106	0.100
Personal norms	-3.162	1.305	-2.423*	0.015		
Ascription of responsibilities	1.086	1.511	0.719	0.472		
Awareness of consequences	-0.516	1.657	-0.311	0.755		
Climate change beliefs	0.013	0.156	0.081	0.935		
Environmental values	-2.952	4.440	-0.665	0.506		
Benevolence	-1.615	3.370	-0.479	0.632		
Power	-1.759	2.856	-0.616	0.538		
Achievement	-2.250	2.613	-0.861	0.389		

Hedonism	6.004	2.413	2.488*	0.013		
Gender	-6.009	5.476	-1.097	0.273		
Age	6.588	2.178	3.024**	0.003		
Education	-8.820	3.294	-2.678	0.007		
Income	-0.034	0.067	-0.507	0.612		
Number of people living in the house	25.041	2.094	11.955***	0.000		
Area of residence: Nord East	-2.569	7.730	-0.332	0.740		
Area of residence: Centre	2.770	6.330	0.438	0.662		
Area of residence: South	-5.549	7.249	-0.766	0.444		
Area of residence: Islands	18.207	10.172	1.790†	0.0736		
Rented house	8.819	7.240	1.218	0.223		
Square metres of the house	0.449	0.047	9.672***	0.000		

SIGNIFICANCE: ***P < .001 **P <.01, *P<.05, † P<.1.

The overview of respondents' answers (Table 2) highlights some interesting results to evaluate the effectiveness of the treatment also in the Italian context (H3). To begin with, it increases the level of self-reported pro-environmental behaviours, with significant impact on the synthetic measure, on PEB 2 (hang clothes to dry instead of using dryer) and on PEB 6 (talk to other people about saving energy). Notwithstanding, the motivational drivers do not significantly differ for the two groups. Furthermore, some elements of the environmental background are influenced by the treatment. Specifically, the treatment group exhibits higher personal norms, environmental self-identity and subjective social norms. In support of H4, mediation analysis shows that subjective social norms fully mediate the relation between the treatment and personal norms (Figure 6). Average causal mediation effects are positive and significant (0.126**; 95% CI: [0.029; 0.221]), while the average direct effect is not significant (0.045; 95% CI: [-0.111; 0.210]). A further element worth to be highlighted is that personal norms (β=0.040, SE=0.004, t value=9.675***), as well as subjective social norms (β=0.022, SE=0.004, t value=5.708***), significantly influence the synthetic measure of pro-environmental behaviours. However, when considering the two together, the effect of subjective social norms is no more significant (personal norms: β=0.037, SE=0.005, t value=7.832***; subjective social norms: β=0.004, SE=0.005, t value=0.982).

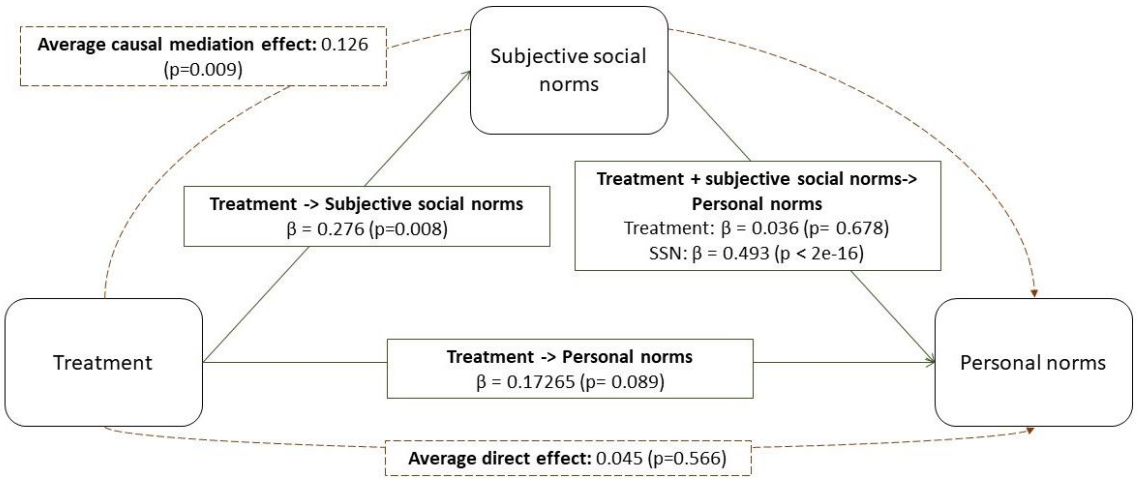

FIGURE 6. REGRESSION MODELS AND MEDIATION EFFECTS BETWEEN TREATMENT, SUBJECTIVE SOCIAL NORMS, AND PERSONAL NORMS

Lastly, there are some elements of the environmental disposition which significantly interact with the treatment. In particular, when regressing single variables, there is positive interaction with personal norms (Table 6, Model 1), environmental self-identity (Table 6, Model 2) and biospheric values and universalism (Table 6, Model 3); a further source of heterogeneity is the residential area: only if the house is located in Italian Islands, the positive effect of the treatment is significant (Table 6, Model 4). For personal norms, environmental self-identity and environmental values, demographic controls were added to individual regressions. Regarding personal norms (Table 6, Model 5), although they dramatically increase the level of energy-saving behaviours, their interaction with the treatment is no more significant. Therefore, this result is not robust to the demographic control, suggesting collinearity between personal norms and demographic characteristics suffer from collinearity. Instead, different results were achieved for environmental self-identity and values: the former (Table 6, Model 6) influences the dependent variable both individually and in the interaction with the treatment. The latter instead, does not have an independent influence on pro-environmental behaviours, but their presence increases treatment effectiveness. Even though interactions between some elements of environmental disposition and treatment were studied only in terms of correlation, they provide interesting insights to discuss H4 (for an extensive discussion, see Section 3.4). The regression analysis conducted to highlight different levels of engagement with the HER within the control group did not provide significant results; hence results are proposed in Appendix 3.

TABLE 6. INTERACTION OF INDIVIDUAL AND COMPOSITE ELEMENTS OF PERSONAL BACKGROUND AND DEMOGRAPHIC CHARACTERISTICS WITH THE TREATMENT (ONLY THOSE WITH SIGNIFICANT INTERACTION ARE REPORTED), DEPENDENT VARIABLE: PEB - SYNTHETIC MEASURE (N=3027)

	β	SE	T-value	P-value	R^2	R^2 adj
Model 1					0.032	0.031
Treatment	-0.094	0.083	-1.140	0.254		
Personal norms	0.026	0.009	2.805**	0.005		
Personal norms: treatment	0.017	0.010	1.647†	0.100		
Model 2					0.039	0.038
Treatment	-0.145	0.093	-1.569	0.117		
Self-identity	0.030	0.010	2.977**	0.003		
Self-identity: treatment	0.023	0.011	2.010*	0.045		
Model 3					0.023	0.022
Treatment	-0.015	0.033	-0.441	0.659		
Environmental values	0.046	0.027	1.686†	0.092		
Environmental values: treatment	0.069	0.031	2.258*	0.024		
Model 4					0.010	0.007
Treatment	-0.013	0.039	-0.325	0.745		
Residential area: Islands	-0.068	0.096	-0.708	0.479		
Residential area: Islands: treatment	0.233	0.104	2.235*	0.026		
Model 5					0.048	0.044
Personal norms	0.026	0.009	2.832**	0.005		
Treatment	-0.122	0.086	-1.414	0.157		
Gender	0.072	0.020	3.712***	0.000		
Age	0.026	0.007	3.587***	0.000		
Education	0.032	0.012	2.747**	0.006		

Residential area: North East	-0.032	0.066	-0.486	0.627		
Residential area: Centre	0.019	0.051	0.379	0.705		
Residential area: South	0.027	0.062	0.437	0.662		
Residential area: Islands	-0.085	0.094	-0.898	0.369		
Income	0.000	0.000	1.143	0.253		
Personal norms: treatment	0.014	0.010	1.350	0.177		
Residential area: North East: treatment	0.090	0.073	1.235	0.217		
Residential area: Centre: treatment	0.062	0.057	1.095	0.274		
Residential area: South: treatment	0.017	0.068	0.250	0.802		
Residential area: Islands: treatment	0.227	0.103	2.208*	0.027		
Model 6					0.056	0.051
Self-identity	0.030	0.010	3.009**	0.003		
Treatment	-0.169	0.096	-1.770†	0.077		
Gender	0.070	0.019	3.608***	0.000		
Age	0.026	0.007	3.503***	0.000		
Education	0.035	0.012	2.967**	0.003		
Residential area: North East	-0.026	0.065	-0.405	0.686		
Residential area: Centre	0.017	0.051	0.335	0.738		
Residential area: South	0.029	0.061	0.472	0.637		
Residential area: Islands	-0.077	0.094	-0.823	0.410		
Income	0.000	0.000	0.987	0.324		
Self-identity: treatment	0.019	0.011	1.735†	0.083		
Residential area: North East: treatment	0.081	0.072	1.122	0.262		
Residential area: Centre: treatment	0.064	0.057	1.127	0.260		
Residential area: South: treatment	0.013	0.068	0.187	0.852		

Residential area: Islands: treatment	0.218	0.102	2.130*	0.033		
Model 7					0.040	0.035
Environmental values	0.040	0.027	1.475	0.140		
Treatment	-0.068	0.045	-1.500	0.134		
Gender	0.057	0.020	2.867**	0.004		
Age	0.022	0.008	2.904**	0.004		
Education	0.033	0.012	2.831**	0.005		
Residential area: North East	-0.026	0.066	-0.398	0.691		
Residential area: Centre	0.022	0.051	0.427	0.670		
Residential area: South	0.041	0.062	0.658	0.511		
Residential area: Islands	-0.055	0.095	-0.582	0.561		
Income	0.000	0.000	1.557	0.120		
Environmental values: treatment	0.067	0.031	2.181*	0.029		
Residential area: North East: treatment	0.086	0.073	1.172	0.241		
Residential area: Centre: treatment	0.074	0.057	1.293	0.196		
Residential area: South: treatment	0.018	0.069	0.265	0.791		
Residential area: Islands: treatment	0.226	0.103	2.195*	0.028		

SIGNIFICANCE: ***P < .001 **P <.01, *P<.05, † P<.1.

3.4 Discussion

Personal norms are a direct determinant of a wide range of pro-environmental behaviours. Aligned with H1, Study 1 allowed to identify a significant relation between the strength of personal norms and the average house electricity consumption, a "medium-to-high cost" pro-environmental behaviour (Kaiser and Schultz 2009). Due to their central role in the final decision, it is important to investigate the process leading to their formation. They derive from two mechanisms that are not mutually exclusive, but rather complementary: they stem from the internalization of social norms, but, at the same time, they are the results of a deep and conscious reasoning about a behaviour's moral consequences. Results of Study 1 are aligned with the proposed argument: both subjective social norms and environmental disposition account for a substantial share of explained variance in personal norms, and have the same predictive power when considered together. Further, consistently with H4, the exposure to normative messages positively affects personal norms and subjective social norms. In fact, the treatment group exhibits a higher level of personal norms compared to the control group; this impact is fully mediated by the effect that the treatment has on subjective social norms. This is an important outcome of normative intervention since personal norms, even when interiorized from external pressure and expectations, are more consistently related to pro-environmental behaviours rather than subjective social norms. Beyond the effect on personal norms, the treatment increases the environmental self-identity too.

On the other hand, other elements that have an indirect impact on the final decision to engage in pro-environmental behaviours, like values, environmental awareness and beliefs, are not affected by the treatment. Hence, it is plausible that the antecedents of personal norms in the Value-Belief-Norm Theory, given their stable and abstract nature, are more likely to derive from a deep elaboration and reflection of moral considerations, from early experiences and education. Then, the effectiveness of the treatment is demonstrated by an higher level of energy-saving behaviours performed by the treatment group; of remarkable interest is the significant difference in the reported level for the behaviour consisting in *talking to other about energy-saving (PEB6)*: indeed, this entails that the treatment not only encourages the target individual to engage in private energy-

saving actions, but it also induces the person to share them with other individuals and potentially increase their interest in the topic as well.

Finally, H2 requires a specific discussion. Indeed, contrary to the expectations, Study 1 shows a positive interaction between the treatment and personal norms, environmental self-identity and environmental values. Notwithstanding, the relation is in term of correlation, and not of causality, thus only speculative reasonings can be performed. As far as personal norms and self-identity are concerned, it is plausible that the higher effectiveness of the treatment on those exhibiting stronger personal norms and self-identity is due to a double effect of the exposure to the HER: for those individuals more influenced by the treatment on the side of environmental background, the treatment may be also more effective on the side of behavioural change. This assumption is supported by empirical evidence, as the treatment has an effect on personal norms and environmental self-identity. This rational is also aligned with extant literature, which argued that normative influence is lower in those individuals already holding personal beliefs and norms about the relevant behaviour. Instead, the positive interaction between the treatment and environmental values is likely to be explained by the opposite mechanism: the treatment is more effective on those individuals exhibiting environmental values. Indeed, as already discussed, the treatment does not influence values. Furthermore, environmental values are an indirect predictor of pro-environmental behaviours, and sometimes they fail to promote consistent moral conduct; however, by increasing the salience of relevant information, such as standard behaviour and social expectations, it is possible to activate them and lead to pro-environmental decisions.

A deeper discussion, which integrates findings of Study 1 with results of Study 2, and addresses policy implications, limitations and future developments as well, is proposed in Chapter 6.

4 STUDY 2: ONLINE EXPERIMENT

The aim of Study 2 was to test whether an intervention based on the integration of two behavioural mechanisms succeeded to convince a higher number of individuals to behave environmentally-responsible, compared to the exposure to individual treatment. Hypotheses tested at this step are listed below.

H5a: *Reminding individuals their past pro-environmental behaviours strengthens their environmental self-identity.*

H5b: *The stronger the environmental self-identity, the higher the level of engagement in pro-environmental behaviours.*

H6a*: Descriptive normative messages are more effective than environmental self-identity manipulation at influencing pro-environmental behaviours, as they provide a relevant motivational driver also to those individuals who might not have any other reason to engage in pro-environmental behaviours.*

H6b (H2 in Study 1): *Social normative influence is less effective in those individuals already exhibiting environmental disposition and norms.*

H7: *The combined effect of the two treatments leads to the highest number of participants adopting the environmentally-friendly behaviour.*

The analysis was performed with an experimental design, to test the combined and individual influence of the treatments on the decision to donate to an environmental organization, as well as to investigate their interactions with the elements of the environmental disposition and with demographic features. In line with Study 1, the analysis paid particular attention to personal norms: indeed, in the previous Study, they assumed a determinant role in the final decision to reduce energy consumption; however, it was not possible to completely figure out how the presence of strong personal norms affects the exposure to normative influence -thus, H2 is explored at this step too.

4.1 METHOD

4.1.1 PARTICIPANTS AND PROCEDURE

The experiment was made accessible on the platform Prolific Academic on the 5th of June. Prolific Academic is an online working platform which ensures access to subjects residing primarily in the UK; 400 Prolific users completed the experiment. Each participant received $1 as fixed participation payment and an additional bonus between $0 and $1, depending on the individual's decision on how to allocate it during the experiment. The survey lasted on average 15 minutes.

The design adopted in this study was 2*2, in which the salience of environmental self-identity (treatment 1) and of normative information (treatment 2) were manipulated; participants were randomly assigned to one out of four experimental conditions. Table 7 summarises the treatments and displays the number of participants for each of them. After the exposure to the treatments, participants were asked to engage in a pro-environmental behaviour as dependent variable; practically, they were asked whether they wanted to donate part of or the entire extra-payment to a representative environmental organisation. In order to avoid negative order effect, respondents were first proposed with the dependent variable and then completed the section to measure their environmental disposition. It was assumed that the decision to donate would have been influenced after answering questions about environmental background, because such questions could prime environmental self-perception in an uncontrolled fashion, and affect the effectiveness of the treatments. Moreover, between the dependent variable and the section with the questions about the environmental disposition, participants had to answer some unrelated questions to reduce the effect of the treatment on these measures. The entire text is reported in Appendix 4.

TABLE 7. TREATMENTS OVERVIEW AND PARTICIPANTS PER EXPERIMENTAL CONDITION (N=397*)

		Treatment 1 (SI)	
Treatment 2 (SN)		Self-identity manipulation	Control
	Salient social norms	SI – SN: 104	C – SN: 95
	Control	SI – C: 95	C – C: 103

*ONE PARTICIPANT HAS BEEN REMOVED FROM THE ANALYSIS SINCE HE REPEATED THE TEST THRICE

Table 8 reports demographic characteristic of the sample. As in Study 1, some baseline variables were unbalanced, leading to potential biased results of statistical analyses (Roberts and Torgers 1999). As far as education is concerned, there was a higher percentage of individuals who have attained secondary school in the group exposed to the two treatments rather than the one receiving only treatment 1. Further, this latter group was characterised by the highest percentage of post-graduates compared to all the other experimental conditions. Lastly, individuals treated only with normative influence exhibited a higher percentage of bachelor's degrees compared to those treated with the two practices. Regarding participants' income, there were imbalances for two earning groups: firstly, there was a higher percentage of individual with an average income between £ 1,000 and 2,000 in the group receiving only treatment 2 than the one exposed to both conditions; secondly, participants exposed to self-identity manipulation displayed a higher percentage with an income between £ 5,000 and 7,000 compared to the control condition. Finally, the group receiving only normative information was characterised by a higher percentage of Hispanic and Latin ethnicity than all the other experimental conditions. Nonetheless, results were robust to demographic controls also in Study 2 (see Section 4.1.4)

TABLE 8. DEMOGRAPHIC CHARACTERISTICS OF EXPERIMENT PARTICIPANTS.

	SI – SN			SI – C			SN – C			C – C		
	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD
Gender (percentage female)	104	0.442	0.499	95	0.463	0.501	95	0.411	0.494	103	0.466	0.501
Year of birth	104	1986.106	9.862	95	1985.726	9.522	95	1986.484	9.895	103	1986.010	10.526
Schooling: primary or lower	104	0.010	0.098	95	0.021	0.144	95	0.021	0.144	103	0.000	0.000
Schooling: secondary school	104	0.500[a]	0.502	95	0.337[a]	0.475	95	0.389	0.490	103	0.456	0.500
Schooling: bachelor's degree	104	0.337[b]	0.475	95	0.389	0.490	95	0.474[b]	0.502	103	0.398	0.492
Schooling: postgraduate degree	104	0.154[c]	0.363	95	0.253[c,d,e]	0.437	95	0.116[d]	0.322	103	0.146[e]	0.354
Income: less than 500 €	104	0.029	0.168	95	0.074	0.263	95	0.063	0.244	103	0.078	0.269
Income: between 500 and 1,000 €	104	0.183	0.388	95	0.147	0.356	95	0.105	0.309	103	0.126	0.334
Household income: between 1,000 and 2,000 €	104	0.250[f]	0.435	95	0.284	0.453	95	0.389[f]	0.502	103	0.320	0.469
Household income: between 2,000 and 3,000 €	104	0.231	0.373	95	0.158	0.367	95	0.189	0.394	103	0.165	0.373
Household income: between 3,000 and 5,000 €	104	0.135	0.343	95	0.137	0.345	95	0.116	0.322	103	0.175	0.382
Household income: between 5,000 and 7,000 €	104	0.058	0.234	95	0.074[g]	0.263	95	0.042	0.202	103	0.019[g]	0.139
Household income: between 7,000 and 10,000 €	104	0.029	0.168	95	0.042	0.202	95	0.053	0.224	103	0.019	0.139
Household income: more than 10,000 €	104	0.087	0.283	95	0.084	0.279	95	0.042	0.202	103	0.097	0.297
Ethnicity: Caucasian	71	0.859	0.362	68	0.765	0.427	79	0.799	0.404	70	0.800	0.402
Ethnicity: African	71	0.042	0.201	68	0.029	0.170	79	0.025	0.304	70	0.014	0.119

Ethnicity: East Asia	71	0.014	0.108	68	0.059	0.218	79	0.038	0.106	70	0.057	0.214
Ethnicity: Latino/Hispanic	71	0.024[h]	0.152	68	0.086[h,i]	0.283	79	0.023[i]	0.149	70	0.036	0.187
Ethnicity: Middle Eastern	71	0.024	0.152	68	0.015	0.111	79	0.013	0.126	70	0.024	0.153
Ethnicity: South Asia	71	0.012	0.108	68	0.009	0.103	79	0.023	0.149	70	0.036	0.187
Ethnicity: Mixed	71	0.028	0.186	68	0.029	0.156	79	0.038	0.232	70	0.014	0.214

T-TEST WITH DIFFERENT VARIANCES, TWO TAILS: [a]p: 0.020, [b]p: 0.050, [c]p: 0.086, [d]p: 0.015, [e]p: 0.061, [f]p: 0.036, [g]p: 0.075, [h]p: 0.079, [i]p: 0.072, [l]p: 0.083.

4.1.2 MATERIALS

4.1.2.1 PILOT TEST

First, it was examined what kind of message would be best for the social normative message. As outlined in Section 2.2.2, individuals tend to comply more with normative messages based on their immediate surroundings. Therefore, 85 participants were recruited on the same online platform to complete a pilot survey about the decision to support the selected environmental organization, with the objective of creating the norm as close as possible to the context where the main study took place. Specifically, the pilot test reported two relevant questions to create the normative message: the former aimed at collecting data about the injunctive norm ("Since everyone has different ideas about supporting environmental organisations, we are using this survey to understand individuals' behaviour in case they have the chance to choose whether to support or not one of them. Best known as the world's leading conservation body, WWF is active in safeguarding the natural world, tackling the global threat of climate change and helping people to change the way they live. Do you think that supporting an environmental charity like WWF help contribute to address environmental issues?"), while the latter about the descriptive norm ("If you had the opportunity to donate part of your participation fee of this survey to WWF, how much would you donate?"). The motivation to ask both was that, in case the result of the second question had described a non-environmentally-friendly standard behaviour, the use of an injunctive norm would have been more appropriate to encourage the desired behaviour. Results of the pilot test were favourable for both norm constructs: 72.9% of participants were willing to donate, and the overall percentage donated was £ 0.2 (40% of the participation payment). Regarding the injunctive norm, 82.3% of respondents at least somewhat agreed with the usefulness of supporting environmental organisations to tackle climate change. Even though both norms influence decision-making, when interventions emphasize the high frequency of behaviours, they also imply social approval for the same behaviours (Miller and Prentice 2016); hence, the normative message was designed based on the descriptive norm.

4.1.2.2 TREATMENTS

Self-identity manipulation. Since previous experiments have successfully manipulated environmental self-identity reminding individuals of their previous pro-environmental behaviours, the same technique was applied also in this study. As discussed in Section 2.3.3, the extent to which environmental self-identity is influenced by past pro-environmental behaviours depends on the signalling strength of that specific behaviour and on the frequency individuals engage in it. Given the international nature of the sample, it was important to select environmentally-friendly actions that are common and simple despite the country of origin. Thus, extant studies and experiments were investigated to identify such behaviours. The available scientific literature provided some suggestions about common pro-environmental behaviours in Belgium (Cornelissen et al. 2008) and in Netherlands (Van der Werff et al. 2013a, 2014a); instead, a study performed by Gallup (2010) allowed to consider also behaviours widespread in US. Table 9 reports all the common environmental behaviours collected to design treatment 1.

TABLE 9. SELECTION OF PRO-ENVIRONMENTAL BEHAVIOURS TO DESIGN THE MANIPULATION OF SELF-IDENTITY

Netherlands	Belgium	US
I separate paper from my waste	Selectively disposing of household garbage	Voluntary recycled newspapers, glass, aluminium, motor oil, or other items
I bring glass bottle to the recycling bin	Using the bike instead of the car when possible	Reduced your household's use of energy
I do not throw litter on the street	Avoid littering	Replaced standard light bulbs in your home with compact fluorescent light bulbs
I turn off electrical appliances (to save energy)	Turn off electrical appliances (to save energy)	Bought product specifically because you thought it was better for the environment
I often go to work or study by bike instead of by car	Using both sides of scratch paper	Used reusable shopping bags at grocery stores instead of the standard plastic or paper bags
I turn off the heater when I leave my room	Disposing cans and milk cartons in a separate garbage bag	
I use energy-efficient light bulbs	Leaving a clean spot after a picnic	
I turn off the lights when no one is in the room	Buying a less polluting product if there is a choice in the shop	

Based on the result of the research, 8 behaviours reflecting a broad set of activities (i.e., transport, recycling, shopping habits and energy use) that were performed in more than one country were selected for the treatment (Table 10). Engagement mean values reported in Table 10 show that the selected behaviours were actually common among respondents. The manipulation consisted in asking participants how often they performed the proposed behaviours on a 5-point scale (from "Never" to "Always"). Half of participants were randomly assigned to the treatment condition, and had to indicate how often they perform the common pro-environmental behaviour. To increase their representativeness of the ecological category, the behaviours were positively cued ("Which of the following environmental activities do you perform? Please indicate how often do you perform them"). The other half of participants was allocated to the control condition, and reported how often they perform 8 behaviours which are not related to the environment (e.g., "I read the newspaper", "I go to the theatre to watch drama"). Although previous studies added an experimental condition called "environmentally-unfriendly group" (see Section 2.3.2), consisting in manipulating the self-identity by asking participants how often they engage in difficult and uncommon behaviours, it was not replicated in this study. This decision was motivated by the appraisal that this condition mainly did not lead to results significantly different from the control group.

TABLE 10. MEANS AND STANDARD DEVIATIONS OF THE FREQUENCY OF PRO-ENVIRONMENTAL BEHAVIOURS

Simple and common pro-environmental behaviours	Mean	SD
I turn off the lights when no one is in the room	4.322	0.869
I do not throw litter on the street	4.573	0.966
I recycle newspapers, glass, aluminium, motor oil, or other items	3.794	1.190
I turn off electrical appliances (to save energy)	3.834	1.043
I move around by bike and/or public transportation	3.216	1.359
I buy a less polluting product if there is a choice in the shop	3.095	1.157
I use reusable shopping bags at grocery stores instead of the standard plastic or paper bags	3.769	0.653
I leave a clean spot after a picnic	4.653	0.762

Normative message. Stemming from the result of the pilot study, the normative message reported the descriptive norm. The treatment consisted in providing the relevant

information when participants had to decide whether and how much to donate to the environmental organisation, in order to activate social norms and increase individuals' compliance with them. Indeed, extant research demonstrates that individual tend to act in a norm-consistent way when their attention is temporarily directed to normative information (Cialdini et al. 1990, 1991; Kallegren et al. 2000). The treatment reported the following text: "*Everyone has different ideas about supporting environmental causes. Especially, we are using this survey to understand individuals' attitudes toward environmental organisations. As part of this survey you will be asked whether you want to make a donation to WWF UK. Best known as the world's leading conservation body, WWF is active in safeguarding the natural world, tackling the global threat of climate change and helping people to change the way they live.* ***Last week, we conducted a similar survey on Prolific: participants were willing to donate on average 40% of their bonus to WWF UK.*** *Would you like to donate part of your participation bonus to WWF UK? Please enter a donation amount between 0£ and 1£. The donation will be subtracted from your bonus payment of 1£. We will send you a proof of donation by email*" (mean= 0.300, SD= 0.367).

In the control condition, no normative message was displayed, and the text read: "*Everyone has different ideas about supporting environmental causes. Especially, we are using this survey to understand individuals' attitudes toward environmental organisations. As part of this survey you will be asked whether you want to make a donation to WWF UK. Best known as the world's leading conservation body, WWF is active in safeguarding the natural world, tackling the global threat of climate change and helping people to change the way they live. Would you like to donate part of your participation bonus to WWF UK? Please enter a donation amount between 0£ and 1£. The donation will be subtracted from your bonus payment of 1£. We will send you a proof of donation by email*" (mean=0.233, SD=0.372).

4.1.3 Measures

4.1.3.1 Environmental disposition

Contrary to Study 1, which was part of a broader research project, Study 2 was specifically developed for the current work. Hence, to increase results reliability, redundant items were adopted to test the same elements and ensure consistency.

To verify the effectiveness of treatment 1 three items were reported, measuring *environmental self-identity*: “Acting environmentally friendly is an important part of who I am”, “I am the type of person who acts environmentally friendly”, “I see myself as an environmentally friendly person” (Cronbach’s alpha: 0.91) (Van der Werff et al. 2013a). Respondents answered on a 7-point scale from “Completely disagree” to “Completely agree”.

As in the previous study, the elements of the Value-Belief-Norm Theory were assessed. Values relevant for the environmental concern were measured (Davidov et al. 2008) on a 6-point scale (from “Not at all like me” to “Very much like me”). *Environmental values* were measured with three items: “It is important that every person in the world is treated equally; everyone should have equal opportunities in life”, “It is important to this person to listen to people who are different from him/her; even in case of disagreement, this person wants to understand them”, “This person strongly believes that people should care for nature. Looking after the environment is important to this person” (Cronbach’s alpha: 0.62); *benevolence* through two items: “It is important to this person to help the people nearby; take care if their well-being”, “It is important to this person to be loyal to friends; to devote to people close to him/her” (Cronbach’s alpha: 0.51); *power* with two items: “It is important to this person to be rich; to have a lot of money and expensive things”, It is important to this person to get respect from others; to make people do what this person says” (Cronbach’s alpha: 0.51); *achievement* with two items: “It is important to this person to show his/her abilities; to have people admire what this person does” and “Being very successful is important to this person; to have people recognize one’s achievements” (Cronbach’s alpha: 0.69); *hedonism* by two items: “It is important to this person to have a good time; to “spoil” oneself”, “This person seeks every chance to have fun; it is important to this person to do things that give pleasure” (Cronbach’s alpha: 0.51).

The *ecological worldview* was measured with the 15-items version of the New Environmental Paradigm on a 5-point Likert scale (Dunlap et al. 2000), with three items for each subdimension: limits to growth: “We are approaching the limit of the number of people the earth can support”, “Humans have the right to modify the natural environment

to suit their needs", "The earth is like a spaceship with very limited room and resources"; delicate equilibrium in nature: "When humans interfere with nature it often produces disastrous consequences", "The balance of nature is strong enough to cope with the impacts of modern industrial nations", "The balance of nature is very delicate and easily upset"; antianthropocentrism: "Humans have the right to modify the natural environment to suit their needs", "Plants and animals have as much right as humans to exist", "Humans were meant to rule over the rest of nature"; exemptionalism: "Human ingenuity will insure that we do NOT make the earth unliveable", "Despite our special abilities humans are still subject to the laws of nature", "Humans will eventually learn enough about how nature works to be able to control it"; possibility of an ecocrisis: "Humans are severely abusing the environment", "The so-called 'ecological-crisis' facing humankind has been greatly exaggerated", "If things continue on their present course, we will soon experience a major ecological catastrophe" (Cronbach's alpha of the New Environmental Paradigm: 0.8).

For the other elements of the Theory, respondents' answer ranged from "Totally disagree" (1) to "Totally agree" (7). *Personal norms* were measured with three items: "I feel morally obliged to act in an environmentally-friendly manner", "I would feel guilty if I did not act in an environmentally-friendly manner", "I would be a better person if I would act in an environmentally-friendly manner" (Van der Werff et al. 2013a) (Cronbach's alpha: 0.81). *Awareness of consequences* counted three items: "I worry about the environmental impact of CO2 emissions caused by human activities", "Human activities cause serious environmental problems, such as climate change" (Cronbach's alpha: 0.79) (Van der Werff and Steg 2015), as well as *ascription of responsibilities*[1]: "I think it is useful to reduce CO2 emissions to reduce environmental problems", "I think I can contribute to reduce environmental problems with my behaviours" (Cronbach's alpha: 0.66) (Van der Werff and Steg 2015).

4.1.3.2 Dependent variables

The dependent measure consisted in a real economic choice, namely the decision to donate part of the additional bonus to WWF UK. The question was in the form of an open answer,

[1] As in Study 1, ascription of responsibilities was proxied with outcome efficacy.

where participants could enter an amount between £0 and £ 1, with two decimals allowed. The importance of forcing individuals to make an actual choice is that pro-environmental intentions and behaviours are not perfectly correlated (Bamberg and Möser 2007); hence, self-reported measures are weaker outcome variables compared to actual decision to engage in the relevant behaviour. Stemming from this datum, the dependent variable was formulated in three ways: *average donation*, which is the mean value of the donation considering all the participants. Then, it was split to consider the impact of the treatment on the extensive margin, i.e. the *percentage of donors* compared to the overall number of participant in the same experimental condition, and on the intensive margin, which is the *average donation among donors* within the same treatment group. Figure 7 summarises the formulation of the dependent variables.

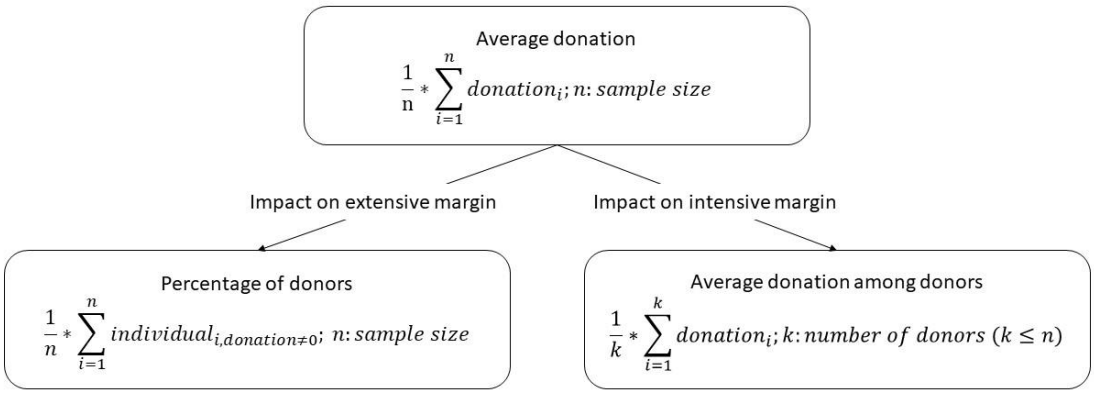

FIGURE 7. DEPENDENT VARIABLES IN STUDY 2

The selection of the specific environmental organisation as beneficiary of the donation was made so as to minimise the influence of it on the dependent variable; thus, on the one hand, it was selected enough known and recognised at international level; on the other hand, its actions and projects should not be perceived too politicised. Therefore, five main facts favoured WWF UK as selected charity:

- It is part of WWF, an international organisation operating in 70 countries all over the world[2]

[2]Retrieved online on 15/04/2017 at http://wwf.panda.org/who_we_are/wwf_offices/

- WWF is in the top 2 reputable wildlife conservation group, spending more than 80% of the money they raise on their campaigns and projects, rather than administration and funding (Strauss 2017)
- It is in the top 5 UK environmental organisations in terms of income (Cracknell et al. 2013) and in the top 30 UK charities considering the fundraising income (Pharoah 2017)
- It is not perceived as radically politicised
- 31.43% of participants currently live in UK.

Table 11 reports an overview of participants' answers.

TABLE 11. MEAN AND STANDARD DEVIATION TO SURVEY ANSWERS.

	SI - SN			SI – C			C – SN			C- C		
	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD
Environmental values[1]	104	0.585	0.542	95	0.626	0.564	95	0.620	0.613	103	0.536	0.658
Benevolence[1]	104	0.479	0.596	95	0.538	0.620	95	0.519	0.574	103	0.589	0.617
Power[1]	104	-0.752[a]	0.655	95	-0.809[b]	0.645	95	-0.982[a,b,c]	0.709	103	-0.814[c]	0.688
Achievement[1]	104	-0.382	0.709	95	-0.388	0.746	95	-0.276	0.655	103	-0.421	0.702
Hedonism[1]	104	-0.223	0.579	95	-0.282	0.645	95	-0.192	0.572	103	-0.158	0.644
New Environmental Paradigm[2]	104	3.570	0.517	95	3.530	0.578	95	3.570	0.542	103	3.604	0.511
Awareness of consequences	104	5.731	1.275	95	5.758	1.229	95	5.563	1.317	103	5.83	1.030
Ascription of responsibilities	104	5.745	1.180	95	5.711	1.161	95	5.689	1.147	103	5.772	0.965
Personal norms	104	5.461	1.221	95	5.449	1.113	95	5.319	1.287	103	5.337	1.060

[1]AS SPECIFIED IN THE CODEBOOK PROVIDED AS INTEGRATION OF EUROPEAN SOCIAL SURVEY (2016b), PARAMETERS OF VARIABLES MEASURING VALUES ARE CENTRAL VALUES, COMPUTED BY SUBTRACTING THE OVERALL MEAN SCORE TO THE MEAN OF THE SPECIFIC VALUE. THEY ARE COMPUTED IN THE SAME WAY IN THE FOLLOWING ANALYSES TOO. [2]NEW ENVIRONMENTAL PARADIGM IS THE MEAN OF THE ANSWERS TO THE 15-ITEMS, WHERE POSITIVE AND LOADING FACTORS ARE SUMMED, AFTER THAT NEGATIVE ONES HAVE BEEN REVERSED (DUNLAP ET AL. 2000). T-TEST WITH DIFFERENT VARIANCES, TWO TAILS: [a]p: 0.019; [b]p: 0.081; [c]p: 0.094.

4.1.4 Analysis

The statistical analyses were performed with R. Since the relevant measures did not respect the normality distribution assumption, Student t-test was not suitable to verify differences between distribution parameters for the different experimental conditions. Therefore, non-parametric tests on distribution were adopted: for differences between two samples, the Wilcoxon rank sum test was implemented (Lowry 2014). Hence, when the analysis required hypothesis testing to compare distributions, this was the test adopted.

Initially, the effectiveness of treatment 1 on environmental self-identity was assessed through differences in mean values between treatment and control group. Further, through a simple regression, it was investigated the relation between environmental self-identity and the decision to donate. Then, variations in the dependent variables for the four experimental conditions were investigated. Also the individual impact of the treatment on the dependent variables was isolated and investigated through Wilcoxon rank sum test. The interactions between the two treatments were analysed through regressions. Finally, for treatment 1, it was explored whether the impact of the manipulation on the dependent variables was mediated by the strength of environmental self-identity. As in Study 1, to perform a mediation analysis, a total of 5000 bootstrap samples, and 95% bias corrected and accelerated confidence intervals were implemented (Preacher and Hayes 2008).

Then, the analysis focused on the sources of heterogeneity of the effectiveness of the treatments. Specifically, through regression analyses, interactions between the treatment and the elements of the environmental disposition were studied: the first regressions considered only personal norms; next, the different elements of the environmental disposition were added, and finally demographic controls too, also to control for possible effects of unbalances among the two treatment and control groups. As in Study 1, the environmental disposition was measured in terms of Value-Belief-Norm Theory, which was verified through correlation analysis.

4.2 Results

Consistently with H5a and H5b, environmental self-identity was successfully increased by treatment 1 (Treatment: Mean= 5.427, SD= 1.093; Control: Mean= 5.185, SD= 1.140;

Wilcoxon rank sum test p-value: 0.014); further, participants who scored higher in the environmental self-identity donated more (β= 0.053, SD=0.016, t-value= 3.208**). Then, Value-Belief-Norm Theory was verified (Table 12), although results were not as straightforward as in Study 1. In fact, some values, specifically universalism, power and achievement, manifested greater effects of the following mediating steps than the other ones. Correlation coefficients for the following elements of the sequence demonstrated the hypothesised distribution of results, with stronger effects between adjacent factors.

TABLE 12. CORRELATION COEFFICIENTS AND SIGNIFICANCE (PEARSON TEST) AMONG THE ELEMENTS OF THE VALUE-BELIEF-NORM THEORY. ALSO ENVIRONMENTAL SELF-IDENTITY IS REPORTED (N= 397)

	EV	Benevolence	Power	Achievement	Hedonism	NEP	AC	AR	PN
Benevolence	0.342***								
Power	-0.667***	-0.545***							
Achievement	-0.611***	-0.463***	0.318***						
Hedonism	-0.355***	-0.347***	0.036	-0.157**					
NEP	0.383***	0.138**	-0.333***	-0.209***	-0.086†				
AC	0.331***	0.074	-0.259***	-0.156**	-0.090†	0.585***			
AR	0.322***	0.104*	-0.280***	-0.142**	-0.099*	0.484***	0.813***		
PN	0.331***	0.098†	-0.232***	-0.112*	-0.194***	0.424***	0.688***	0.729***	
Self-identity	0.283***	0.091†	-0.185***	-0.159**	-0.116*	0.358***	0.573***	0.634***	0.725***

SIGNIFICANCE: ***P < .001 **P <.01, *P<.05, † P<.1. IN THE TABLE: EV: ENVIRONMENTAL VALUES, NEP: NEW ENVIRONMENTAL PARADIGM, AC: AWARENESS OF CONSEQUENCES, AR: ASCRIPTION OF RESPONSIBILITIES, PN: PERSONAL NORMS.

The analysis shows that the two treatments influenced participants' behaviours, in a different extent for the dependent variables and with opposite outcomes (Table 13): treatment 1 decreased the mean value of all the dependent variables; on the contrary treatment 2 increased them. The pattern of results of the four experimental conditions shows that the effect of normative message on individuals' decisions was stronger compared to the impact of self-identity manipulation (H6a): for the first two dependent measures, there is statistically significant difference between the group receiving both treatments and the one receiving only treatment 1 (Table 13). On the other hand, there is not any significant change in the behaviour when the varying element was the presence -or the absence- of treatment 1. Hence, the main driver of behavioural change was normative influence.

A deeper investigation of individual treatments shows that the negative impact of treatment 1 on the average donation was due to a significant lower average donation among donors -i.e. intensive margin- than the control group, while the percentage of donors did not significantly change (Table 14). Instead, treatment 2 significantly increased the average donation via a significant higher percentage of donors -namely, extensive margin- compared to the control condition (Table 15). Moreover, it is worth mentioning that, though not significantly, the amount donated by donors in treatment 2 was lower than the control group. Considering together these two pieces of information, it can be inferred that the normative information convinced those individuals who might not have donated otherwise; however, these subjects are likely to have donated a lower quantity compared to those individuals who would have donated anyway. Finally, the regression analyses show that the two treatments did not significantly interact (Table 16): the impact of each treatment was not influenced by the presence of the other, thus, they simply cumulated their effects.

TABLE 13. IMPACT OF THE TWO TREATMENTS ON THE DEPENDENT VARIABLES

	SI – SN			SI – C			C – SN			C – C		
	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD
Average donation	104	0.285[a]	0.356	95	0.197[a,b]	0.344	95	0.317[b]	0.390	103	0.267	0.385
Percentage of donors	104	0.5[c,d]	0.501	95	0.337[c,e]	0.475	95	0.516[e,f]	0.502	103	0.398[d,f]	0.492
Average donation among donors	104	0.538[g]	0.322	95	0.584	0.355	95	0.614	0.333	103	0.667[g]	0.322

WILCOXON RANK SUM TEST: [A]P: 0.017; [B]P: 0.013; [C]P: 0.006; [D]P: 0.060; [E]P:0.013; [F]P:0.098; [G]P: 0.046

TABLE 14. IMPACT OF SELF-IDENTITY MANIPULATION ON THE DEPENDENT VARIABLES

	SI			Control			P-value[1]
	N	Mean	SD	N	Mean	SD	
Average donation	199	0.243	0.353	198	0.290	0.387	0.381
Percentage of donors	199	0.437	0.497	198	0.454	0.499	0.729
Average donation among donors	87	0.555	0.333	90	0.638	0.328	0.082

[1]WILCOXON RANK SUM TEST

TABLE 15. IMPACT OF NORMATIVE INFLUENCE ON THE DEPENDENT VARIABLES

	SN			Control			P-value[1]
	N	Mean	SD	N	Mean	SD	
Average donation	199	0.300	0.372	198	0.233	0.367	0.011
Percentage of donors	199	0.523	0.501	198	0.369	0.484	0.002
Average donation among donors	104	0.574	0.323	73	0.631	0.337	0.219

[1]WILCOXON RANK SUM TEST

TABLE 16. INTERACTION BETWEEN TREATMENTS

Model	β	SE	T-value	P-value	R^2	R^2 adj
Dependent variable: average donation (N=397)						
Model 1					0.014	0.006
SI	-0.069	0.053	-1.310	0.191		
SN	0.051	0.053	0.970	0.332		
SI:SN	0.037	0.074	0.495	0.621		
Dependent variable: percentage of donors (N=397)						
Model 2					0.026	0.019
SI	-0.061	0.070	-0.873	0.383		
SN	0.118	0.070	1.679†	0.094		
SI:SN	0.074	0.099	0.750	0.454		
Dependent variable: amount donated by donors (N= 177)						
Model 3					0.501	0.492
SI	0.000	0.000	-1.535	0.127		
SN	0.000	0.000	-1.377	0.170		
SI:SN	0.000	0.000	1.058	0.292		

SIGNIFICANCE: ***P < .001 **P <.01, *P<.05, † P<.1

As shown in Table 14, self-identity manipulation was not significantly related to average donation. Nonetheless, the relationship between the independent and the dependent variable do not need to be significant to test mediation effects (James et al. 2006; Shrout and Bolger 2002). Therefore, it was performed a mediated regression analysis to study the

direct effect of the manipulation on the final decision as well as its indirect effect, mediated by the self-identity. Even though treatment 1 had a negative effect on the dependent measure, also mediation analysis supported H5b. Indeed, it clarified that self-identity partially and positively mediated the effect of the treatment on the average donation (Figure 8). Average causal mediation effects are positive and significant (0.013*; 95% CI: [0.002; 0.030]), while the average direct effect is negative and significant (-0.061†; 95% CI: [-0.132; 0.01]). The situation where direct and indirect effect have opposite sign is referred as "inconsistent mediation" (MacKinnon et al. 2007): the negative effect of the exposure to the treatment was due to the direct effect of it in the dependent variable. Instead, the positive effect that treatment 1 had on environmental self-identity, was not enough to compensate the direct negative impact on the dependent variable.

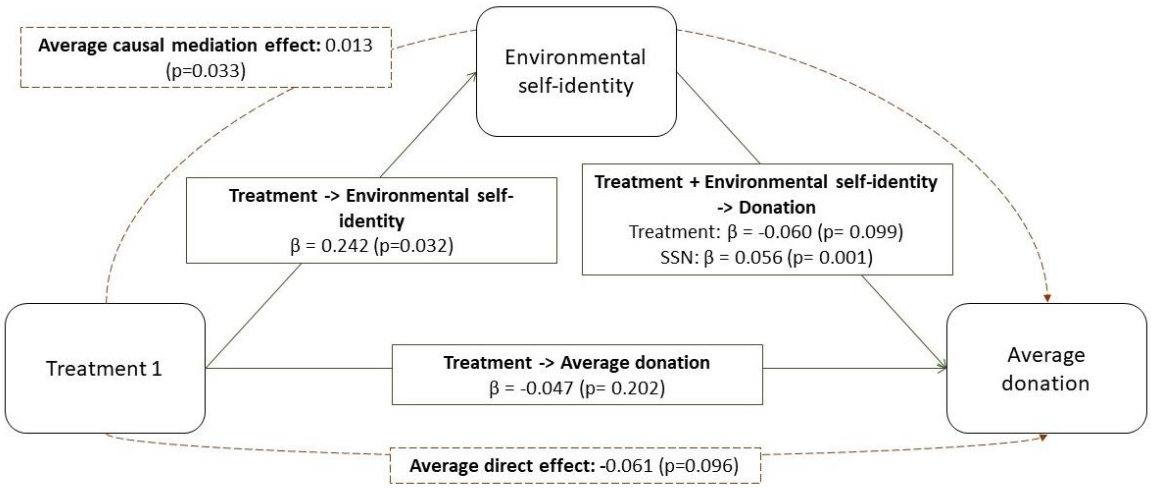

FIGURE 8. REGRESSION MODELS AND MEDIATION EFFECTS BETWEEN TREATMENT 1, ENVIRONMENTAL SELF-IDENTITY, AND AVERAGE DONATION

As explained in Section 4.1.1.1, questions about the environmental background constituted the final part of the experiment. All the control variables are balanced among the four experimental groups, except power (Table 11): those exposed to the normative message exhibited lower level of power compared to the control condition, while the self-identity manipulation resulted in the opposite effect, with significant difference compared to the experimental condition composed only by treatment 2. Therefore, both treatments influenced the strength of power; the direction of the effect of the two treatments is

consistent with extant literature (Karp 1996; Nordlund and Garvill 2002; Steg et al. 2014b; Stern et al. 1995), where power and pro-environmental behaviours were found to be negative related. In fact, treatment 1 increased power, as well as decreased the average donation; instead, treatment 2, decreased this value, and, at the same time, increased the level of pro-environmental behaviours. With regard to the sources of heterogeneity, results are reported only for two dependent variables -i.e., average donation and average donation among donors-, as for the third there were no significant interactions between the treatments, and the independent and control variables (see Appendix 5 for the regression analysis on the percentage of donors). The manipulation of the self-identity did not significantly interact with personal norms (Table 17 Model 2, Table 18 Model 2), nor with the elements of the Value-Belief-Norm Theory closer to the final decision to engage in pro-environmental behaviours. Notwithstanding, there is significant interaction with specific values: Table 17 shows that the higher environmental values, the higher the effectiveness of treatment 1 (Model 3 and 4); Table 18 highlights even more interactions with values (Model 3 and 4): environmental values by themselves have a negative impact on the dependent variable, but they significantly positively interact with the treatment; also achievement and power positively interact with the first manipulation. Note that treatment 1 had an effect on power, thus, for this value the direction of the effect is not certainly inferred. There is not any significant interaction among demographic variables and treatment 1 in predicting any dependent variable. The normative message was characterised by a similar pattern of results: there were no significant interactions with personal norms and with other elements down in the Theory (Table 17 Model 6 and 8, Table 18 Model 6 and 8). However, it was detected a significant negative interaction with achievement for both the dependent variables (Table 17 Model 6 and 8, Table 18 Model 6 and 8). Finally, a further source of heterogeneity for treatment 2 is gender: consistently with previous studies (Eagly 1983), it proved to be more effective on women (Table 17 Model 7, Table 18 Model 7). A final remark about the interaction of the two treatments with personal norms: in both cases, the strength of personal norms is a significant predictor both when regressed individually (Table 17 Model 1 and 2, Table 18 Model 1 and 2) and when regressed together with the treatments (Table 17 Model 5, Table 18 Model 5). In this

latter case, they remain the only significant predictor, showing again the great importance of them in the decision to engage in pro-environmental behaviours, even in case of exposure to treatments explicitly designed to increase the level of environmentally-responsible conducts.

TABLE 17. REGRESSION ANALYSES WITH DEPENDENT VARIABLE: AVERAGE DONATION (N=397).

Model	β	SE	T-value	P-value	R^2	R^2 adj
Model 1					0.060	0.057
Personal norms	0.078	0.015	5.015****	0.000		
Model 2					0.066	0.059
Personal norms	0.079	0.022	3.614***	0.000		
SI	-0.055	0.171	-0.325	0.745		
Personal norms: SI	-0.000	0.031	-0.012	0.990		
Model 3					0.142	0.103
Personal norms	0.017	0.032	0.517	0.606		
Ascription of responsibilities	0.024	0.039	0.606	0.545		
Awareness of consequences	0.054	0.043	1.256	0.210		
New Environmental Paradigm	-0.017	0.058	-0.293	0.769		
Environmental values	-0.044	0.073	-0.598	0.551		
Benevolence	-0.089	0.056	-1.607	0.109		
Power	-0.138	0.062	-2.245*	0.025		
Achievement	-0.096	0.053	-1.827†	0.069		
SI	0.158	0.206	0.764	0.446		
Personal norms: SI	0.007	0.047	0.143	0.886		
Ascription of responsibilities: SI	-0.026	0.060	-0.431	0.667		
Awareness of consequences: SI	-0.022	0.055	-0.401	0.688		
New Environmental Paradigm: SI	0.047	0.085	0.551	0.582		
Environmental values: SI	0.224	0.108	2.079*	0.038		
Benevolence: SI	0.043	0.080	0.540	0.589		
Power: SI	0.136	0.086	1.575	0.116		

Achievement: SI	0.116	0.074	1.575	0.116		
Model 4					0.152	0.104
Personal norms	0.014	0.032	0.431	0.667		
Ascription of responsibilities	0.055	0.043	1.277	0.203		
Awareness of consequences	0.022	0.039	0.571	0.568		
New Environmental Paradigm	-0.012	0.059	-0.203	0.839		
Environmental values	-0.035	0.073	-0.478	0.633		
Benevolence	-0.070	0.057	-1.215	0.225		
Power	-0.134	0.062	-2.158*	0.032		
Achievement	-0.105	0.053	-1.992*	0.047		
Gender	0.037	0.038	0.970	0.333		
Age	0.003	0.002	1.405	0.161		
Education	0.018	0.025	0.728	0.467		
Income	-0.006	0.010	-0.626	0.531		
SI	0.175	0.207	0.843	0.400		
Personal norms: SI	0.012	0.047	0.267	0.790		
Ascription of responsibilities: SI	-0.030	0.060	-0.498	0.619		
Awareness of consequences: SI	-0.026	0.056	-0.473	0.636		
New Environmental Paradigm: SI	0.051	0.086	0.598	0.550		
Environmental values: SI	0.215	0.108	1.985*	0.048		
Benevolence: SI	0.036	0.081	0.442	0.659		
Power: SI	0.128	0.087	1.466	0.143		
Achievement: SI	0.119	0.074	1.602	0.110		
Model 5					0.003	0.000
Personal norms	0.076	0.024	3.225***	0.001		

SN	0.054	0.172	0.315	0.753		
Personal norms: SN	0.002	0.031	0.077	0.939		
Model 6					0.144	0.1054
Personal norms	0.008	0.036	0.238	0.812		
Ascription of responsibilities	0.021	0.044	0.487	0.627		
Awareness of consequences	0.038	0.038	0.994	0.321		
New Environmental Paradigm	0.022	0.061	0.366	0.715		
Environmental values	0.112	0.072	1.549	0.122		
Benevolence	-0.048	0.052	-0.923	0.357		
Power	-0.029	0.058	-0.503	0.616		
Achievement	0.016	0.050	0.324	0.746		
SN	-0.016	0.207	-0.076	0.939		
Personal norms: SN	0.028	0.047	0.590	0.556		
Ascription of responsibilities: SN	0.044	0.061	0.730	0.466		
Awareness of consequences: SN	-0.061	0.057	-1.079	0.281		
New Environmental Paradigm: SN	-0.001	0.086	-0.008	0.994		
Environmental values: SN	-0.144	0.107	-1.356	0.176		
Benevolence: SN	-0.046	0.083	-0.562	0.574		
Power: SN	-0.101	0.087	-1.158	0.248		
Achievement: SN	-0.138	0.075	-1.849†	0.065		
Model 7					0.023	0.016
Gender	0.094	0.052	1.805†	0.072		
SN	0.169	0.055	3.057**	0.002		
Gender: SN	-0.183	0.074	-2.476*	0.014		
Model 8					0.167	0.1176

Personal norms	0.020	0.036	0.566	0.572		
Ascription of responsibilities	0.019	0.044	0.439	0.661		
Awareness of consequences	0.035	0.038	0.919	0.359		
New Environmental Paradigm	0.028	0.060	0.471	0.638		
Environmental values	0.114	0.072	1.576	0.116		
Benevolence	-0.011	0.054	-0.203	0.839		
Power	-0.028	0.058	-0.472	0.637		
Achievement	0.006	0.050	0.128	0.898		
SN	0.185	0.217	0.855	0.393		
Gender	0.131	0.053	2.47*	0.014		
Age	0.002	0.002	1.263	0.207		
Education	0.021	0.025	0.849	0.396		
Income	-0.009	0.010	-0.921	0.358		
Personal norms: SN	0.009	0.047	0.199	0.842		
Ascription of responsibilities: SN	0.044	0.061	0.734	0.463		
Awareness of consequences: SN	-0.057	0.056	-1.005	0.316		
New Environmental Paradigm: SN	-0.002	0.086	-0.028	0.977		
Environmental values: SN	-0.136	0.106	-1.281	0.201		
Benevolence: SN	-0.079	0.084	-0.942	0.347		
Power: SN	-0.092	0.087	-1.054	0.293		
Achievement: SN	-0.131	0.074	-1.765†	0.079		
Gender: SN	-0.183	0.074	-2.463*	0.014		

SIGNIFICANCE: ***P < .001 **P <.01, *P<.05, † P<.1. NOTE: HEDONISTIC VALUES HAVE BEEN EXCLUDED FORM THE REGRESSIONS BECAUSE IT EXHIBITED PERFECT COLLINEARITY WITH OTHER VARIABLES

TABLE 18. REGRESSION ANALYSES WITH DEPENDENT VARIABLE: AVERAGE DONATION AMONG DONORS (N=177)

Model	β	SE	T-value	P-value	R^2	R^2 adj
Model 1					0.031	0.025
Personal norms	0.061	0.026	2.362*	0.0193		
Model 2					0.052	0.035
Personal norms	0.052	0.036	1.448	0.149		
SI	-0.241	0.299	-0.806	0.421		
Personal norms: SI	0.026	0.052	0.503	0.616		
Model 3					0.209	0.124
Personal norms	-0.031	0.051	-0.605	0.546		
Ascription of responsibilities	0.085	0.059	1.443	0.151		
Awareness of consequences	0.053	0.056	0.943	0.347		
New Environmental Paradigm	0.124	0.089	1.389	0.167		
Environmental values	-0.216	0.099	-2.181*	0.031 *		
Benevolence	-0.011	0.080	-0.138	0.891		
Power	-0.194	0.081	-2.402	0.017*		
Achievement	-0.070	0.068	-1.030	0.305		
SI	0.497	0.394	1.262	0.210		
Personal norms: SI	0.111	0.073	1.509	0.133		
Ascription of responsibilities: SI	-0.148	0.095	-1.565	0.120		
Awareness of consequences: SI	-0.051	0.090	-0.569	0.570		
New Environmental Paradigm: SI	-0.121	0.127	-0.952	0.343		
Environmental values: SI	0.550	0.151	3.642***	0.000		
Benevolence: SI	0.081	0.120	0.681	0.497		
Power: SI	0.272	0.120	2.267*	0.025		

Achievement: SI	0.187	0.101	1.852†	0.0659		
Model 4					0.210	0.103
Personal norms	-0.026	0.053	-0.495	0.621		
Ascription of responsibilities	0.085	0.059	1.426	0.156		
Awareness of consequences	0.049	0.058	0.847	0.398		
New Environmental Paradigm	0.119	0.092	1.291	0.199		
Environmental values	-0.219	0.101	-2.170*	0.032		
Benevolence	-0.007	0.083	-0.087	0.931		
Power	-0.199	0.083	-2.403*	0.017		
Achievement	-0.076	0.071	-1.070	0.286		
Gender	0.020	0.054	0.366	0.715		
Age	0.001	0.003	0.305	0.761		
Education	0.004	0.034	0.118	0.906		
Income	0.003	0.014	0.200	0.842		
SI	0.518	0.402	1.289	0.199		
Personal norms: SI	0.106	0.075	1.421	0.157		
Ascription of responsibilities: SI	-0.150	0.096	-1.563	0.120		
Awareness of consequences: SI	-0.050	0.091	-0.552	0.582		
New Environmental Paradigm: SI	-0.101	0.134	-0.756	0.451		
Environmental values: SI	0.547	0.154	3.549***	0.000		
Benevolence: SI	0.078	0.125	0.627	0.532		
Power: SI	0.273	0.124	2.208*	0.029		
Achievement: SI	0.185	0.103	1.802†	0.073		
Model 5					0.038	0.021
Personal norms	0.055	0.046	1.198	0.232		

SN	-0.102	0.322	-0.316	0.753		
Personal norms: SN	0.008	0.056	0.145	0.885		
Model 6					0.038	0.021
Gender	0.124	0.078	1.581	0.116		
SN	0.077	0.077	1.000	0.319		
Gender: SN	-0.235	0.101	-2.318*	0.022		
Model 7					0.123	0.029
Personal norms	0.018	0.061	0.291	0.772		
Ascription of responsibilities	-0.004	0.079	-0.049	0.961		
Awareness of consequences	0.030	0.066	0.458	0.648		
New Environmental Paradigm	0.103	0.099	1.036	0.302		
Environmental values	0.077	0.108	0.712	0.477		
Benevolence	0.112	0.094	1.190	0.236		
Power	-0.008	0.096	-0.081	0.936		
Achievement	0.090	0.075	1.202	0.231		
SN	-0.127	0.427	-0.297	0.767		
Personal norms: SN	0.016	0.081	0.200	0.842		
Ascription of responsibilities: SN	0.054	0.100	0.539	0.591		
Awareness of consequences: SN	-0.054	0.094	-0.572	0.568		
New Environmental Paradigm: SN	-0.024	0.134	-0.178	0.859		
Environmental values: SN	-0.160	0.158	-1.008	0.315		
Benevolence: SN	-0.177	0.127	-1.393	0.166		
Power: SN	-0.129	0.128	-1.010	0.314		
Achievement: SN	-0.187	0.108	-1.731†	0.085		
Model 8					0.130	0.012

Personal norms	0.022	0.062	0.346	0.730		
Ascription of responsibilities	0.005	0.081	0.058	0.954		
Awareness of consequences	0.029	0.067	0.429	0.669		
New Environmental Paradigm	0.107	0.101	1.063	0.289		
Environmental values	0.085	0.111	0.767	0.445		
Benevolence	0.125	0.096	1.309	0.193		
Power	-0.002	0.099	-0.024	0.981		
Achievement	0.088	0.078	1.128	0.261		
Gender	0.268	0.057	0.855**	0.004		
Age	0.001	0.003	0.357	0.722		
Education	-0.012	0.035	-0.341	0.734		
Income	0.003	0.015	0.211	0.833		
SN	-0.036	0.443	-0.082	0.935		
Personal norms: SN	0.025	0.085	0.290	0.772		
Ascription of responsibilities: SN	0.037	0.102	0.364	0.716		
Awareness of consequences: SN	-0.061	0.096	-0.636	0.526		
New Environmental Paradigm: SN	-0.015	0.136	-0.109	0.913		
Environmental values: SN	-0.185	0.162	-1.142	0.255		
Benevolence: SN	-0.191	0.129	-1.480	0.141		
Power: SN	-0.153	0.133	-1.151	0.252		
Achievement: SN	-0.196	0.110	-1.775†	0.078		
Gender: SN	-0.347	0.113	-3.066**	0.003		

SIGNIFICANCE: ***P < .001 **P <.01, *P<.05, † P<.1. NOTE: HEDONISTIC VALUES HAVE BEEN EXCLUDED FORM THE REGRESSIONS BECAUSE IT EXHIBITED PERFECT COLLINEARITY WITH OTHER VARIABLES

4.3 DISCUSSION

In Study 2, an online experiment was developed to analyse the potential of a new communication strategy, based on the integration of two behavioural mechanisms leveraging on different motivational drivers. The study led to unexpected results for one of the two treatments. Indeed, consistently with H5a, reminding people of their simple past pro-environmental behaviours (treatment 1) had a significant positive effect on the environmental self-identity, as they realized that they often act environmentally-friendly. Moreover, in line with H5b, environmental self-identity was positively related to the decision to donate part of the participation payment. Nonetheless, the overall impact of the treatment on the dependent variables was negative: mediation analysis showed that the positive effect of the treatment on the environmental self-identity was not enough to compensate the direct negative effect caused by the treatment on the decision to donate. A closer investigation demonstrated that the negative effect of self-identity manipulation was concentrated on the amount donated by donors, rather than on the percentage of donors. A possible discussion of this result is that those individuals who would have donated in any case still donate, regardless the fact that they received the treatment. Nonetheless, they may perceive that they could contribute less to support the proposed environmental organisation, since they already made some personal efforts by engaging in the environmental behaviours to preserve the environment. This unintended consequence of the treatment is a negative spillover (see Section 2.3.2 for an overview of spillover effects), as the intervention inhibited individuals' willingness to engage in further environmental choices. Thus, even if individuals successfully inferred their environmental attitude from their past pro-environmental behaviours, they did not act consistently with it. Since no data were collected about potential spillover effects, only theoretical conjectures can be performed to explain the undesired outcome. Conceivably, the negative spillover was caused by moral licensing, either because the enhanced sense of morality perceived with treatment 1, or because the perception of have already contributed with own behaviours to the common good, legitimated treated participants to pass up the opportunity to engage in a new pro-environmental behaviour. This negative effect caused by treatment 1 falsified H7, which hypothesised that the combination of the two

treatments would have outperformed the individual treatments and the control condition in convincing individuals to engage in the relevant behaviour.

As demonstrated also by past experiments and interventions, by increasing the salience of normative information (treatment 2), it was possible to influence individuals' behaviours toward the socially desirable outcome. Specifically, treatment 2 significantly increased the number of people who decided to donate part of their participation payment, probably because it provided a reason to donate also to individuals who might not have any other motivational driver. This result was supported also by the greater impact treatment 2 had on the dependent variable compared to treatment 1 (H6a), as this latter sought to leverage mainly on environmental drivers.

Coherently with Study 1 and with extant researches, personal norms were tightly and systematically related to the decision to donate. Contrary to expectations (H6b), no significant interaction was detected between them and the two treatments; specifically, the analysis showed that normative influence did not depend on the strength of personal norms and beliefs. Rather, personal norms were the only significant predictor when considering them and the exposure to the treatments. Hence, the presence of personal norms proved to be a central determinant of behaviour also in context of Study 2. Nevertheless, there was a significant interaction between the treatments and specific values. The manipulation of the self-identity allowed to activate universalistic and biospheric values, as the presence of environmental values increases the impact of treatment 1; this result is consistent with Study 1, where the provision of relevant information was effective at activating environmental values and at convincing individuals to act in line with them. However, contrary to Study 1, normative information did not activate environmental values. Surprisingly, also a positive interaction between self-identity manipulation, and power and achievement values was detected, resulting in greater effectiveness of the treatment in those individuals holding them.

5 DISCUSSION AND CONCLUSIONS

5.1 GENERAL DISCUSSION AND ELEMENTS OF NOVELTY

The aim of the current set of studies was to contribute with innovative advancements to the stream of literature which focuses on individuals' behavioural change as part of mitigation strategies to tackle the causes of current environmental problems. Specifically, it is aligned with extant research seeking to develop practical methods to influence decision-making, by investigating specific behavioural mechanisms to be targeted by environmental policies and social marketing interventions. Stemming from the review of existing literature, some research questions were developed: firstly, the role of personal norms in the decision to engage in pro-environmental behaviours, even when they entail high personal and situational costs. Secondly, it was investigated the effectiveness of normative messages on behavioural change and the influence of social expectations on the elements of the environmental background in case of prolonged exposure to the relevant information, with a special interest on subjective social norms and personal norms. A further element of research was constituted by the effect of the environmental background already endorsed by the target on the influence of interventions based on normative information. Finally, it was investigated the potential effectiveness derived from the combination of normative message with environmental self-identity manipulation, as innovative intervention to convince individuals to behave pro-environmentally.

Research questions were investigated by means of two empirical studies. Study 1 took place in the context of a large-scale campaign jointly proposed by two large multinational enterprises in the Italian framework, aiming at reducing households' electricity consumption through normative influence. In Study 1, a survey was developed to collect data relevant to contribute to the research questions; the analysis was complemented with information about actual household behaviours provided by the companies, such as historical electricity consumption. In Study 2, an online experiment was developed, in order to test whether the integration of the two aforementioned behavioural mechanisms was effective at encouraging a greater number of individuals to behave pro-environmentally, compared to individual treatments. Moreover, data about environmental disposition and norms were gathered to consolidate results achieved in Study 1.

The following sections summarise the main findings and elements of novelty of the current work, as well as common and contrasting results of the two Studies. A detailed discussion of research questions addressed by each Study, and how results contributed to previous literature is proposed in Section 3.4 (Study 1) and Section 4.3 (Study 2). Table 19 summarises initial hypotheses and how main findings of the empirical studies contributed to them.

TABLE 19. RESERACH HYPOTHESES AND FINDINGS OF THE TWO STUDIES

Hypotheses		Contribution
Study 1: H1	Personal norms are a central determinant of pro-environmental behaviours even when these exhibit high situational and personal costs.	*Verified:* personal norms were significantly related to the household electricity consumption, a "medium-to-high cost" behaviour. Besides, in Study 2, they were also a central determinant of the decision to donate to an environmental charity, a simple and low-cost action.
Study 1: H2/ Study 2: H6b	Social normative influence is less effective in those individuals already exhibiting environmental disposition and norms, since they are already intrinsically motivated to act pro-environmental.	*Falsified/impossible to validate:* in Study 1, the treatment positively and significantly interacted with personal norms, environmental self-identity and environmental values. Nonetheless, it is not possible to conclude whether the presence of these elements increased the effectiveness of the treatment or if it was the treatment that influenced them and, simultaneously, the engagement in energy-saving behaviours. It is conceivable that for personal norms and self-identity the second mechanism applied; instead, environmental values are more likely to be explained by the first direction of change. In Study 2, no interaction between normative information and personal norms was observed.

Study 1: H3	Interventions based on normative social influence work in the Italian framework.	*Verified:* the treatments significantly increased the level of self-reported energy-saving behaviours.
Study 1: H4	By exposing individuals to social norms over a substantial period of time, it is possible to influence their subjective social norms. In turn, subjective social norms influence personal norms.	*Verified:* the treatment group exhibited a significant higher level of personal norms and subjective social norms. Mediation analysis shows that the effect of the prolonged exposure to social influence on personal norms was fully mediated by subjective social norms.
Study 2: H5a	Reminding individuals of their past pro-environmental behaviours strengthens their environmental self-identity.	*Verified:* environmental self-identity manipulation significantly strengthened it.
Study 2: H5b	The stronger the environmental self-identity, the higher the level of engagement in pro-environmental behaviours.	*Verified:* those individuals exhibiting higher level of environmental self-identity donated more. However, *self-identity manipulation decreased the average donation*: the positive effect that the treatment had on environmental self-identity, was not strong enough to prevent the occurrence of negative spillover effect.
Study 2: H6a	Descriptive normative messages are more effective than environmental self-identity manipulation at influencing pro-environmental behaviours, as they provide a relevant motivational driver also to those individuals who might not have any other reason to engage in pro-environmental behaviours.	*Verified:* the influence of normative information was stronger than the effect of self-identity manipulation on the decision to engage in pro-environmental behaviours.

Study 2: H7	The combined effect of the two treatments leads to the highest number of participants adopting the environmentally-friendly behaviour.	*Falsified:* while normative influence influenced the behaviour towards the desired outcome, self-identity manipulation resulted in the opposite effect. Hence, the exposition to the second treatment negatively affected behaviours, decreasing the average donation to the environmental charity.

5.1.1 Personal norms as direct determinant of pro-environmental behaviours

A common thread of the work is embodied in personal norms, defined as the feeling of moral obligation to select a specific behavioural alternative (Schwartz 1977). Extant literature systematically succeeded in identifying a direct and significant relation between personal norms and pro-environmental conducts (Bamberg et al. 2007; Bratt 1999; Harland et al. 1999; Hopper and Nielsen 1991; Nordlund and Garvill 2003; Ong and Musa 2011; Stern et al. 1999; Thøgersen 1999; Thøgersen and Ölander 2006). Consistently with these results, in both Studies personal norms proved to be a significant direct determinant in two behaviours characterised by different structural features: while Study 1 analysed the relation between personal norms and electricity consumption, a behaviour with high situational costs in terms of effort and economic resources, Study 2 focused on the donation to an environmental charity, a rather simple and low-cost action. The outcome of Study 2 is aligned with extant literature stating that environmental disposition is a relevant predictor when situational costs are limited; Stern and colleagues (1999) already observed a relation between personal norms and the decision to support an environmental cause through donations. Inversely, Study 1 informed the debate on how personal attitude relates with demanding behaviours with new evidence. Indeed, within the scientific community, two antithetical perspectives are supported: on the one hand, there is evidence that the more difficult the external conditions, the weaker the importance of attitudinal factors (Abrahamse and Steg 2011; Harland et al. 1999; Ortega-Egea et al. 2014; Steg et al. 2014b; Stern 2000; Vanderberg 2005); on the other hand, evidence of the opposite pattern has been found as well (Black et al. 1985; Schultz and Oskamp 1996; Van der Werff and Steg 2015). This latter stream of research argues that attitudes are a stronger

determinant of pro-environmental behaviour when situational constraints are powerful and demanding, and, thus, when effort is required. Consistently with this argumentation, Study 1 observed a significant and direct relationship between the average household electricity consumption and personal norms: despite the set of variables affecting the conservation behaviour, the significant infrastructural costs required to improve energy efficiency, and the behavioural dimension related to the usage of energy-using devices, the feeling of moral obligation to conserve energy was a significant predictor. Hence, findings of Study 1 support the argument that individuals endorsing personal norms are likely to persevere and put more effort also in the context of behaviours displaying these features.

5.1.2 Introjected and integrated personal norms

Despite the widespread evidence that personal norms are a central determinant of pro-environmental decisions, they can be integrated into the moral self to a different extent, and, as a result, they exert stronger or weaker influence on the selection of the behavioural alternative (Thøgersen 2006, 2009). Introjected norms are the result of superficially internalised and accepted social expectations, without a reflection about consequences of own conduct; instead, integrated norms stem from a thorough processing and evaluation of behavioural outcomes, which result in their assimilation within the moral self. Hence, it is clear-cut that the process of formation of the two constructs is different, as well as their motivational roots. Within this framework, Study 1 aimed at investigating the effect of the prolonged exposure to social norms on personal norms. Previous studies already investigated the impact of subjective social norms on personal norms (See Section 5.1.4); however, this is one of the first studies exploring the effect of medium-term exposure to normative messages on subjective social norms and personal norms. Results were surprising: normative information significantly strengthened the two norms directly; a deeper investigation showed that subjective social norms completely mediated the effect of the treatment on personal norms. This entails that the prolonged exposure to this type of messages increased the perceived social expectations, which, in turn, strengthened the feeling of moral obligation to behave pro-environmentally. Hence, campaigns based on social norms lead to twofold benefits: not only they influence behaviours when the relevant decision is made; but also, they affect personal norms, by inducing individuals to introject

social expectations. Given their embeddedness in the cognitive structure personal norms guide behaviours in most situations compared to other norm constructs (the motivational roots of norms for environmental responsible behaviours): the interiorization of social and subjective norms and their development in personal norms is not a "by-product" of normative interventions, but rather, a significant positive outcome. Nonetheless, it is argued that personal norms deriving from this process are likely to become introjected personal norms. In support to this discussion, a study performed by Paluck and Green (2009) showed that subjects exposed to radio programs about social conflicts and resolution changed their perception of social norms, as well as their behaviours, even though their attitudes and beliefs regarding causes and consequences of the undesired conduct were not altered. Extant evidence demonstrates that although introjected norms are important determinants of the action (Thøgersen 2006), integrated norms are more systematically related to behaviour, even in case it exhibits high situational costs: for instance, a study by Thøgersen (2009) observed that personally meaningful outcome and goals, as well as integrated personal norms, were stronger predictors of the decision to buy organic food rather than recycling. As a consequence, future studies should try to complement normative messages with measures aimed at stimulating reflections in the recipient, for instance about personally meaningful outcomes of the target behaviour, or the positive impact that engaging in the relevant pro-environmental action has, or, finally, the motivation underlying the adoption of the behaviour by relevant others. The goal of these new messages would be to encourage a process of personal reasoning and evaluation of behavioural consequences and moral motivations when the social norm is internalized, so as to facilitate the integration of social expectations in the self, rather than achieving a superficial interiorization.

Even though personal norms partially derive from the introjection of social expectation, they are more than this. In fact, according to the Value-Belief-Norm Theory, the decision to engage in environmentally-responsible conducts is the result of a causal chain of elements, which moves from stable but abstract values, to more focus beliefs about the relation between human and nature; then, the evaluation of negative consequences of personal decisions on the environment, and the perceived ability to contribute to reduce

these problems by behaving pro-environmentally, strengthen personal norms, the final determinant in the decision to act respecting the environment (Stern 2000). Both Study 1 and Study 2 validated the elements of the environmental disposition antecedent personal norms and the decision to act environmentally-friendly: personal norms deriving from this process are more likely to be integrated in the self-concept, as they root in values and beliefs. Besides, Study 1, in line with previous results (Thøgersen 2009), confirmed the double nature of personal norms: both subjective social norms and environmental background accounted for a substantial share of explained variance in personal norms, and they were equally strongly related to them when considered together.

5.1.3 Environmental self-identity and spillover effects

Beside personal norms, another important element of the environmental disposition which derives from environmental values is the environmental self-identity, defined as the degree to which individuals see themselves as someone who behave pro-environmentally (Van der Weff et al. 2014a). Indeed, since values are an important and stable component of a person's self-concept, they contribute to a person sense of identity. Like personal norms, also environmental self-identity is an important predictor of pro-environmental behaviours, as individuals are willing to be consistent with their moral self, and to act in line with what they have said or done previously (Steg 2016). Previous studies demonstrated that, by reminding people their past behaviours, it is possible to encourage them to realize they are the type of person who engages in pro-environmental behaviours, strengthening their environmental self-identity (Cornelissen et al. 2008; Van der Werff et al. 2013a, 2014a, 2014b). Thus, practitioners could be tempted to implement simple campaigns based on individuals past behaviours in order to foster people to recognise themselves in the ecological category. However, in the literature there is mixed evidence about the possibility to encourage the decision to engage in future pro-environmental behaviours stemming from previous actions (Van der Werff et al. 2014a): some studies revealed a phenomenon of inconsistent conducts -namely, a negative spillover- wherein a past pro-environmental behaviour inhibited a following one. For instance, these results were observed by Tiefenbeck and colleagues (2013), who observed that individuals who reduced water consumption increased their electricity usage in a second moment. Another

study by Bolton and colleagues (2006) showed that consumers increased their consumption if they were informed about the recyclability of the products they were going to use. A further example is of specific relevance for Study 2, as the authors found that after engaging in pro-environmental behaviours, participants were less willing to donate to an environmental charity (Clot et al. 2016). Consistently with this wealth of literature, while inversely to the outcomes achieved by the experiments proposed by Cornelissen and colleagues (2008) and van der Werff and colleagues (2013a, 2014b, 2014a), in Study 2 self-identity manipulation resulted in lower level of donation to an environmental charity. Mediation analysis showed that environmental self-identity was indeed strengthened by the treatment, but this positive effect was not enough to prevent the occurrence of licensing effect. Although this is the only study which achieved a negative outcome on the dependent measure from the same manipulation, the pattern of results is advocated to be at least as reliable as previous studies. Indeed, the current work exhibited design features which allow to generalise the results achieved in Study 2: the sample was international and it was not constituted only by students, differently from extant experiments (Cornelissen et al. 2008; Van der Werff et al. 2013a, 2014b, 2014a); further, the dependent variable was a real economic choice, rather than a self-reported behaviour, contrary to three out of four past experiments (Van der Werff et al. 2013a, 2014b, 2014a). Due to the negative spillover effect, the proposed experiment did not achieve the desired outcome of increasing the number of people adopting the pro-environmental behaviour. It is worth mentioning potential spillover effects also in the context of Study 1. Indeed, previous researches observed a negative spillover in those households who strived to reduce their energy consumption, as the efforts to conserve energy resulted in lower support and acceptability of pro-environmental policies and international climate agreements (Lacasse 2015, 2016; Truelove et al. 2016). Hence, it is of paramount importance to consider the possibility that undesired unintended outcomes result from interventions like the project outlined at Study 1.

Many explanations have been provided by the literature to understand the reasons underlying these phenomena. Firstly, since engaging in pro-environmental behaviour is considered as a moral action (Stern 2000), the corresponding boost in one's moral self-

concept may subsequently licence selfish policy or behavioural preferences (Khan and Dhar 2006). Secondly, environmentally-friendly conducts may increase the perception of having already contributed to the common good, and thus the subject might feel justified in not engaging in a new pro-environmental behaviour (Kahneman et al. 1993; Thøgersen and Crompton 2009). Then, the impression of sufficient progress resulting from own behaviour may decrease the perceived need of environmental good provision and, as a consequence, following or alternative pro-environmental actions may not be considered necessary; in this case, different pro-environmental conducts are perceived as substitutes, rather than complements (Werfel 2017). Similarly to this hypothesis, Fishback and Dahr (2005) stated that individuals make decisions according to the goals they hold, and thus consistency -or inconsistency- effects depend on an individual's goal focus. Indeed, the engagement in a behaviour which leads closer to the achievement of an objective can be interpreted by an individual in two ways: either as goal progress or as goal commitment (Mullen and Monin 2016). The former case takes place when the individual considers the previous goal-related behaviour as evidence of having made progresses to the goal, which could lead to the perception of goal achievement and fulfilment. Hence, the subject shifts the cognitive resources away from the initial goal, and focus on new objectives (Dhar and Simonson 1999; Fishbach and Dhar 2005; Monin and Miller 2001). The second case, instead, applies when the individual perceives past goal-related behaviour as evidence of goal commitment, with the result of persevering in allocating the resources on the same objective and of strengthening one's determination to achieve it. Subsequently, the actor is motivated to reduce inconsistencies and avoid focusing on other goals (Shah et al. 2003; Fishbach et al. 2006). In the domain of pro-environmental behaviours, this framework suggests that when an individual focuses on goal progress, subsequent behaviours will be reduced after the engagement in the initial pro-environmental action; on the other hand, when focusing on goal commitment, consistent environmentally-friendly behaviours are likely to be detected (Geng et al. 2016). Therefore, negative spillover effects can be diminished, and even prevented, if the intervention is able to shift the focus of individuals on goal commitment (Fishbach et al. 2009). Extant experiments observed that goal commitment can be achieved by reminding individuals of the reasons why they previously

performed the behaviours (Mukhopadhyay et al. 2008; Geng et al. 2016), or by asking individuals to report their commitment towards environmental goals (Geng et al. 2016). The studies showed that focusing on goal commitment allowed to increase behavioural consistency and reduce negative spillover effects: hence, goal commitment focus is a promising path for pro-environmental intentions and behaviours over the long term. Future researches could try to replicate the experiment proposed in Study 2 with a main difference: self-identity manipulation should be complemented with treatments aiming at boosting personal commitment to the goal of tackling general instances of environmental problems, like climate change or pollution. Hence, such interventions could investigate the impact on spillover effects of reminding individuals of their past pro-environmental actions -to target self-identity- and of the motivations which led them to engage in the relevant behaviours -to encourage behavioural consistency. Moreover, it would be interesting to investigate whether and how the dependent variable affects spillover effects in this type of intervention. In fact, Cornelissen et al. (2008), through the self-identity manipulation implemented also in the context of Study 2, successfully strengthened it and increased the dependent measures, which consisted in product choice and scratch paper usage. Therefore, it could be interesting to understand if the contradictory results are caused by the pro-environmental behaviour selected as dependent variable, and if there are specific typologies of actions that create positive -or negative- synergies. Finally, it is suggested to investigate potential spillover effects on other private-sphere behaviours and on policy acceptability caused by the campaigned proposed by the two companies, in order to guarantee that its overall outcome is positive for the environment.

5.1.4 Normative influence: effectiveness and interaction with environmental disposition

The current work provides further evidence of the effectiveness of normative influence on individuals' behaviours. Indeed, in both Study 1 and Study 2, by increasing the salience of relevant others' standard conduct, individuals complied with it and acted more pro-environmentally, whether the behaviour regarded energy conservation or environmental charity support -both performed in the private sphere. Given the non-transferability of results across countries and the lack of large scale studies which investigate the impact of

campaigns based on social norms in the Italian context, Study 1 provided promising initial findings about the effectiveness of this type of campaigns, even in this specific national context. Moreover, in Study 2, consistently with past researches (Schultz 1999; Nolan et al. 2008), the influence of normative information was stronger than the impact of self-identity manipulation. Subsequently, it is this possible to infer that this type of intervention provides a persuasive appeal also for those individuals who might not have any other reason to engage in pro-environmental behaviours. Nonetheless, results of the two Studies did not allow to fully understand the interaction between personal and social norms: in Study 1, a positive interaction was observed, but it was likely caused by a twofold effect of the intervention, which strengthened personal norms and influenced behaviours simultaneously. In addition, in Study 2 no significant interactions between the two norm constructs was detected. Hence, contrary to the study by Göckeritz and colleagues (2010) and to preliminary expectations, the current work suggests that the presence of strong personal norms and beliefs does not negatively affect the outcome of this type of interventions. Instead, an element of the environmental disposition which significantly interacts with normative influence and with self-identity manipulation relies in environmental values. Previous literature demonstrated that individuals are more likely to act in line with their values when they are activated: when relevant thoughts become more accessible during the decision-making process, individuals will probably translate biospheric values and beliefs into preservation behaviours (Ratneshwar et al. 2003). On the contrary, empirical evidence showed that activating a value results in value-congruent behaviour only if the value was central to the self-concept (Verplanken and Holland 2002). Biospheric value activation, in those individuals actually endorsing an environmental disposition, proved to be fairly simple and effective in many contexts: situational cues in the form of pictures (e.g., pictures of nature at the entrance of supermarket) (Biel et al. 2005) or of messages, like environmental information and behavioural consequences (e.g. provide environmental information about car sharing) (Evans et al. 2013), significantly influenced individuals toward value-congruent behaviours. The current work observed that other potential activators of environmental values are normative influence (Study 1) and self-identity manipulation (Study 2).

5.2 POLICY IMPLICATIONS

The work has relevant practical implications, as it provides practitioners with insights on which elements should be prioritize and targeted to increase the effectiveness of environmental interventions. An initial important finding suggests that, given their central role in the decision to engage in any kind of pro-environmental behaviours, the goal of environmental interventions would have higher chances to be achieved if they successfully create or strengthen favourable personal norms. As demonstrated by extant literature and by the current work, there are two possible paths to achieve such goal: on the one hand, they can be strengthened, or even created, by the internalization of social expectations. Hence, policies and interventions based on medium-term exposure to normative information represent a promising path to influence environmental disposition, mainly by mean of introjected personal norms. Hence, it is recommended a wider adoption of normative programs by public and private bodies; moreover, future interventions should investigate whether combining normative information with further stimuli facilitates the integration of social expectations into the moral self (see Section 5.1.2). Two more aspects support the implementation of normative interventions. They are able to activate social norms when the relevant decision is made, and thus they attain the immediate result of influencing decision-making process. Besides, findings of the current work suggest that they do not negatively interfere with environmental disposition already hold by the subject; rather, they proved to activate environmental values and to decrease the widely recognised value-action gap. On the other hand, (integrated) personal norms are the result of one environmental disposition, whose essential antecedent consists in biospheric and self-transcendent values. Thus, a main aim of environmental policies should consist in creating environmental values. The focus on value orientation entails other benefits beside the positive influence on personal norms and self-identity: they are an intrinsic motivational driver, thus, they motivate individuals to act pro-environmentally because of the inherent pleasure and satisfaction deriving from the moral conduct, and they ensure behavioural persistence across time and domains. Furthermore, environmental values create positive synergies with the recommended normative interventions, and are easily activated with situational cues. Values are formed during childhood, as a result of the

individual's needs, traits, experiences, socialization and culture (Bardi and Goodwin 2011), and once formed, they are relatively stable over time (Stern and Dietz 1994; Dietz et al. 2005). Policy interventions can expose children to alternative experiences and ways of thinking, so as to expand and broaden their mental models during the adolescence and the adulthood. Specifically, an education system which fosters children to play and spend time in the natural environment, is a way to increase children's contact with nature and offer children the opportunity to learn about and engage with it (Harris 2017). This type of experience leads to several positive benefits for the children and for the society as well (Attwood 2010; Falch-Lovesay et al. 2005; Murray and O'Brien 2005; Ridgerset al. 2012); among these positive impacts, the contact with nature is of paramount importance in the development of an environmental disposition and sensitivity: evidence suggests that childhood experiences in nature are the root of long-term pro-environmental attitude and values (Chawla and Cushing 2007; Ernst and Theimer 2011), and ultimately inspire individuals to protect it (Beery and Wolf-Watz 2014; Brügger et al. 2011).

Finally, due to the mixed evidence in terms of interventions that seek to boost pro-environmental behaviours stemming from past actions, practitioners are suggested to avoid them unless innovative contributions in how to prevent negative spillover effects are available.

5.3 LIMITATIONS AND FUTURE DEVELOPMENTS

Beyond the proposed developments of the work about the facilitation of integration of introjected norms in the moral self (Section 5.1.2), the prevention of negative spillover effects in the domain of self-identity manipulation and the analysis of potential unintended outcomes of the intervention proposed by the two companies (Section 5.1.3), further research is needed to investigate future results in the context of Study 1. Indeed, time was still premature and data were not enough to understand the real impact of normative information on household electricity consumption. Hence, the effectiveness of the treatment in the Italian framework was measured through energy-saving self-reported behaviours. Future studies are needed to evaluate variations of energy consumption in the treatment group, both during the intervention and after it, to assess the staying effect on

energy saving habits. Moreover, in the current work, introjected and integrated personal norms were not measured independently; rather, only general personal norms were controlled: future analyses could investigate whether the prolonged exposure to social expectations actually affect introjected personal norms, as discussed in this study, or it is possible to observe an impact on integrated personal norms too. Within these studies, it would be important to investigate also the effect of the treatment on personal norms after some time the treatment will finish, so as to understand the real potential of personal norms deriving from a temporary and "imposed" salient social norms. Finally, the current research provides initial findings, which are different form extant literature and from early expectations, about the potential interaction between environmental disposition and norms with treatments based on social norms; hence, future research can provide further insights in the debate about the influence of social expectations on the decision-making process of individuals endorsing favourable personal norms.

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APPENDIXES

APPENDIX 1: SURVEY PROPOSED IN STUDY 1

Buongiorno

Questo questionario fa parte di un progetto di ricerca sui valori delle persone, in particolare sui temi dell'ambiente e dell'energia. Il progetto è finanziato dall'Unione Europea. Il suo nome è stato selezionato in modo casuale dalla lista di clienti. Vorremmo chiedere il suo punto di vista riguardo diversi argomenti. Le sue risposte verranno trattate in modo strettamente confidenziale, ma permetteranno una migliore comprensione delle opinioni e dei desideri degli Italiani riguardo alle loro vite in generale ed all'ambiente in particolare.

Doxa è incaricata della realizzazione dell'indagine. Le risposte saranno trattate in maniera anonima da DOXA ed utilizzate esclusivamente per fini statistici.

Ai sensi del D. Lgs n° 196/2003 (Codice in materia di protezione dei dati personali - Legge sulla Privacy) e del codice deontologico Assirm, La informiamo di quanto segue:

Il trattamento a cui saranno sottoposti tutti i dati personali richiesti o acquisiti è diretto unicamente allo svolgimento della ricerca, quindi i dati saranno trattati esclusivamente a tali fini. La informiamo che le risposte che ci fornirà saranno separate dai suoi dati anagrafici in modo da impedire l'associazione tra intervistato e risposte e che saranno comunicate soltanto in forma aggregata; Il trattamento dei dati sarà effettuato manualmente e con strumenti informatici; Il conferimento dei dati è facoltativo e l'eventuale rifiuto non ha conseguenze; I dati non saranno oggetto di comunicazione ad altri soggetti al di fuori di quelli coinvolti nello svolgimento dell'indagine: DOXA - e le persone fisiche e/o giuridiche (incluse le consociate) di cui questa si avvale nello svolgimento della suddetta ricerca. Quest'ultima, che dispone esclusivamente delle informazioni relative a nominativi e indirizzi e-mail, non avrà in nessun modo la possibilità di abbinare le risposte fornite ai nomi; Le sue risposte verranno trattate esclusivamente in forma anonima da DOXA – e dalle persone fisiche e/o giuridiche (incluse le consociate) di cui questa si avvale nello svolgimento della suddetta ricerca – in fase di elaborazione dei dati del questionario; È nella sua facoltà l'esercizio dei diritti di accesso previsti dall'articolo 7 del D. Lgs n° 196/2003

Lei potrà esercitare i suddetti diritti scrivendo, via e-mail, a: MAIL_DOXA@DOXA.IT

Una volta iniziata la compilazione potrà fermarsi e, in qualunque momento, riprendere da dove ha interrotto la compilazione cliccando nuovamente sul link ricevuto nella e-mail di invito.

Per ringraziarla della sua partecipazione al termine della compilazione riceverà a questa indirizzo email un buono Amazon del valore di 3€ da utilizzare per i suoi acquisti online.

1. Accetta di partecipare all'indagine?
    a. Si
    b. No
2. Lei è
    a. Maschio
    b. Femmina
3. In che anno è nata/o?

19…….

4. . Quante persone nelle seguenti fasce di età abitano in casa sua?

	Nessuno	1	2	3	4 o più
Fino a 10 anni:					
Tra 11 e 19 anni					
Tra i 20 e i 64 anni:					
Sopra i 65 anni:					

5. Quanti maschi e femmine abitano in casa sua?

	Nessuno	1	2	3	4 o più
Maschi					
Femmine					

6. Dove è nata/o?
    a. In questa città o provincia
    b. In questa regione, ma in una provincia diversa da questa
    c. Regione
    d. Paese straniero
7. Da quanto tempo vive in questa città o provincia?

Anni:……

8. Qual è il livello di educazione più alto che lei ha ottenuto?
    a. Scuola primaria
    b. Scuola secondaria di primo grado
    c. Scuola secondaria di secondo grado
    d. Laurea (quadriennale, triennale o magistrale)
    e. Master o Dottorato di ricerca
9. Di seguito trova una lista di redditi mensili. Potrebbe dirmi in che gruppo si trova il suo nucleo famigliare, considerando tutti gli stipendi, le pensioni e le altre fonti di reddito, al **netto** di tasse e altre deduzioni?
    a. Meno di 500 €
    b. Tra i 500 e i 1000 €
    c. Tra i 1000 e i 2000 €
    d. Tra i 2000 e i 3000 €
    e. Tra i 3000 e i 5000 €
    f. Tra i 5000 e i 7000 €
    g. Tra i 7000 e i 10000 €
    h. Più di 10000 €
    i. Non so
10. La casa in cui vive è
    a. Di sua proprietà
    b. In affitto
11. Da quanto vive in questa casa?

Anni: …….

12. Quanto è grande la sua casa?

Metri quadri: ……

13. Generalmente, quante ore al giorno passa online?
    a. Non faccio uso di internet
    b. Meno di un’ora

c. Tra 1 e 2 ore
d. Tra 3 e 4 ore
e. Tra 4 e 5 ore
f. Più di 5 ore

14. Da luglio 2016, quanto ha speso in prodotti e migliorie per l'efficienza energetica, ad esempio acquisto di elettrodomestici a basso consumo o sostituzione degli infissi?
    a. Nulla
    b. Da 0 a 50 €
    c. Da 50 a 100 €
    d. Da 100 a 500 €
    e. Più di 500 €

15. Quanto spesso..

	Mai	Raramente	Qualche volta	Spesso	Sempre
a. Lava i vestiti in acqua fredda (30° o meno)?					
b. Stende i vestiti ad asciugare invece di usare un'asciugatrice?					
c. Spegne le luci quando esce da una stanza?					
d. Cambia la temperatura del condizionatore o termostato quando esce da casa?					
e. Stacca la spina degli apparecchi elettronici quando non li usa?					
f. Parla con gli altri di risparmio energetico?					

16. [Se15 ha almeno due risposte "spesso" o "sempre"] Qual è il motivo principale per cui lo fa?
    a. Per risparmiare
    b. Per proteggere l'ambiente
    c. Abitudine
    d. Altro: ……

17. [Altrimenti] Qual è il motivo principale per cui **non** lo fa?
    a. Abitudine

b. Perché non hanno un impatto sull'ambiente tale da giustificare lo sforzo

c. Perché non causano un risparmio economico tale da giustificare lo sforzo

d. Altro: ……

	Possiede il seguente elettrodomestico?	Se sì, quanti anni fa lo ha acquistato?
Piano a induzione		
Forno elettrico		
Frigo		
Frezeer/Frigo addizionale		
Lavastoviglie		
Lavatrice		
Asciugatrice		
Aria condizionata		
Bollitore elettrico		

18. Quante televisioni ha in casa sua?

a. 0

b. 1

c. 2

d. 3 o più

19. Che percentuale delle lampadine che ha in casa è a basso consumo (ad esempio, lampadine fluorescenti e LED)?

a. 0%

b. Meno del 50%

c. Più del 50%

d. 100%

e. Non so

20. Ha comprato lampadine a basso consumo da luglio 2016?

a. Si

b. No

21. [se 20 = "Si"] Quante?
Numero:…….

22. Nella sua casa è presente almeno uno dei seguenti oggetti: Home theater, Sauna, Solarium, Piscina, vasca idromassaggio, Jacuzzi, Aquarium/Terrarium?

a. Si

b. No

23. Da luglio 2016, ha visitato la sua area personale all'interno del sito?
    a. Si
    b. No

24. [Se 23="si"] Che contenuti ha visualizzato?
    a. Consigli su come risparmiare energia
    b. Il suo consumo elettrico negli ultimi 12 mesi
    c. Profilo energetico
    d. Il confronto tra i suoi consumi elettrici e quelli di case simili alla sua

25. Pensa che potrebbe ridurre il suo consumo di energia rispetto a quello attuale?

Assolutamente no								Assolutamente si	
1	2	3	4	5	6	7	8	9	10

26. . Senza guardare la sua bolletta, saprebbe dirmi quanto ha speso per l'ultima bolletta dell'elettricità?

Euro:……

27. . Senza guardare la sua bolletta o altre fonti, quanto pensa che 1 Kilowattora (kWh) di elettricità costi in media in Italia?
    a. Euro al kWh (centesimi):
    b. Non so

28. . Quanto potrebbe risparmiare sostituendo una convenzionale lampadina alogena con una lampadina LED (con la stessa luminosità)?
    a. 30%
    b. 50%
    c. 80%
    d. Non so

29. Di seguito trova la descrizione di alcune persone. Potrebbe indicare per ogni descrizione in che misura quella persona le assomiglia?

	Molto simile a me	Simile a me	In qualche modo	Poco simile a me	Diversa da me	Molto diversa da me

			simile a me			
Per questa persona è importante avere nuove idee, essere creativa e fare le cose a modo suo						
Per questa persona è importante essere ricca, avere molti soldi e possedere oggetti costosi						
Per questa persona è importante vivere in un'ambiente sicuro, evitare qualsiasi cosa che potrebbe essere pericolosa						
Per questa persona è importante divertirsi, "viziarsi"						
Per questa persona è importante fare qualcosa di buono per la società						
Per questa persona è importante rispettare gli animali e le piante, considerare il proprio benessere allo stesso livello delle altre entità del mondo naturale						
Per questa persona è importante aiutare le persone vicine, prendersi cura del loro benessere						
Per questa persona è importante essere di successo, avere gli altri che riconoscano i suoi successi						
Per questa persona è importante l'avventura e prendere dei rischi, avere una vita eccitante						
Per questa persona è importante comportarsi sempre correttamente, evitare di fare qualcosa che						

qualcuno definirebbe sbagliata						
Per questa persona è importante proteggere l'ambiente, interessarsi alla natura e conservare le risorse						
Per questa persona è importante la tradizione, seguire le abitudini tramandate dalla sua famiglia o religione						
Per questa persona è importante risparmiare, evitare di spendere dove è possibile						

30. Per favore indichi quanto è d'accordo con le seguenti affermazioni.

	Totalmente in disaccordo				Totalmente d'accordo		
Agire a favore dell'ambiente è una parte importante della persona che sono							
Mi sento moralmente obbligata/o a risparmiare energia							
La maggior parte delle persone importanti per me mi approva quando provo a risparmiare energia							

31. Forse è a conoscenza della tesi secondo la quale il clima globale sta cambiando a causa delle emissioni di gas serra prodotte dall'uomo. Qual è la sua opinione a riguardo?

a. Assolutamente vero
b. Probabilmente vero
c. Probabilmente non vero
d. Assolutamente non vero
e. Non voglio rispondere
f. Non so

32. Per favore indichi quanto è d'accordo con le seguenti affermazioni.

	Totalmente in disaccordo		Totalmente d'accordo

Il consumo di energia causa problemi ambientali, tra cui il cambiamento climatico							
Sono preoccupata/o delle emissioni di gas serra causate dal consumo di energia							
Penso di poter contribuire a ridurre i problemi ambientali se limito il mio consumo di energia							

33. . Di seguito trova alcune affermazioni riguardo come lei si percepisce. Per ogni frase, selezioni la risposta che la rappresenta meglio.

Penso di essere una persona che…	Completamente in disaccordo	Abbastanza in disaccordo	Nè d'accordo nè in disaccordo	Abbastanza d'accordo	Completamente d'accordo	Non so
…è riservata						
…in linea di massima si fida degli altri						
…tende ad essere pigra						
…è tranquilla, gestisce bene lo stress						
…ha pochi interessi artistici						
…è estroversa, socievole						
…tende a criticare gli altri						
…è meticolosa						
…si innervosisce facilmente						
…ha una fervida immaginazione						

34. Tutto considerato, quanto si sente soddisfatta/o della sua vita in generale in questo momento? *Usi la seguente scala, in cui 1 indica "Completamente insoddisfatta/o" e 10 "Completamente soddisfatta/o".*

Completamente insoddisfatta/o						Completamente soddisfatta/o			
1	2	3	4	5	6	7	8	9	10

35. Alcune persone sentono di avere completa libertà nelle loro scelte e pieno controllo sulle loro vite, mentre altre percepiscono che le proprie azioni non influenzano ciò che

accade loro. Quanta libertà di scelta e controllo pensa di avere sulla sua vita? *Usi la seguente scala, in cui 1 indica "Nessuna scelta" e 10 "Molta scelta".*

Nessuna scelta									Molta scelta
1	2	3	4	5	6	7	8	9	10

36. . In generale, è disposta/o ad assumere rischi o tende ad evitarli? *Usi la seguente scala, in cui 1 indica "Avversa/o al rischio" e 10 "Disposta/o ad assumere rischi".*

Avversa/o al rischio									Pronta/o ad assumere rischi
1	2	3	4	5	6	7	8	9	10

37. Pensi alle persone che vivono nel suo quartiere o nella sua comunità. *Usi la seguente scala in cui 1 significa "Molto diverso" e 10 "Molto simile" per indicare la risposta alle seguenti domande.*

    a. In generale, quanto ritiene simili tra loro le persone che vivono nel suo quartiere o nella sua comunità?

Molto diversa/o									Molto simile
1	2	3	4	5	6	7	8	9	10

    b. In generale, quanto si ritiene simile alle altre persone che vivono nel suo quartiere o nella sua comunità?

Molto diversa/o									Molto simile
1	2	3	4	5	6	7	8	9	10

38. Nella figura riportata di sotto, immagini che in ogni riga il cerchio sulla sinistra rappresenti la sua identità e quello sulla destra l'identità dei membri della sua comunità locale. Quale caso rappresenta meglio il grado di vicinanza tra la sua identità e quella dei membri della sua comunità locale?

39. In generale, lei direbbe che ci si può fidare della maggior parte della gente, o che non si è mai troppo attenti e prudenti nel trattare con la gente?
    a. Ci si può fidare della maggior parte della gente
    b. Non si è mai troppo attenti e prudenti

40. Di seguito trova una lista di associazioni di volontariato. Per ogni organizzazione, potrebbe dirmi se ne è un membro? Può segnare anche più di una risposta.

	Sì	No
Associazioni ecclesiastiche o religiose		
Associazioni sportive o ricreative		
Associazioni artistiche, musicali o educative		
Sindacati		
Partiti politici		
Associazioni ambientaliste		
Associazioni di professionisti		
Associazioni umanitarie o di beneficienza		
Associazioni di consumatori		
Associazioni di mutuo aiuto		
Altro		

41. Ha fatto una donazione di sangue negli ultimi 12 mesi?
    a. Si
    b. No
    c. Non posso per ragioni mediche

42. Ha votato al referendum costituzionale del 2016?
    a. Si
    b. No

c. Non avevo diritto di voto

43. Quanto è disposta/o a condividere ciò che ha con gli altri, senza aspettarsi niente in cambio? *Usi la seguente scala in cui 1 indica "Per niente disponibile a condividere" e 10 "Molto disponibile a condividere".*

Per niente disponibile a condividere						Molto disponibile a condividere			
1	2	3	4	5	6	7	8	9	10

44. Si riconosce nella seguente affermazione? "Se qualcuno mi fa un favore, sono disposto a ricambiarlo." *Usi la seguente scala in cui 1 significa "Per niente disposta/o" e 10 "Molto disposta/o" .*

Per niente disposta/o						Molto disposta/o			
1	2	3	4	5	6	7	8	9	10

45. In generale, lei è disposto a punire chi si comporta in modo ingiusto, anche se farlo implica sostenere un costo? *Usi la seguente scala in cui 1 significa "Per niente disposto" e 10 "Molto disposto".*

Per niente disposta/o						Molto disposta/o			
1	2	3	4	5	6	7	8	9	10

APPENDIX 2: REGRESSION ANALYSES WITH DEPENDENT VARIABLE: TOP 20% (N=1594).

Model	β	SE	T-value	P-value	R^2	R^2 adj
Model 1					0.000	0.000
Personal norms	-0.002	0.004	-0.332	0.74		
Model 2					0.001	0.000
Environmental self-identity	-0.006	0.005	-1.141	0.254		
Model 3					0.001	0.000
Personal norms	-0.002	0.005	-0.306	0.760		
Ascription of responsibilities	-0.002	0.006	-0.252	0.801		
Awareness of consequences	0.000	0.007	0.016	0.987		
Climate change perception	0.000	0.001	-0.360	0.719		
Environmental values	0.007	0.013	0.545	0.586		
Benevolence	0.004	0.011	0.321	0.748		
Power	-0.003	0.011	-0.249	0.804		
Achievement	0.003	0.010	0.284	0.776		
Hedonism	-0.003	0.009	-0.286	0.775		
Model 4					0.061	0.049
Personal norms	0.000	0.005	-0.072	0.943		
Ascription of responsibilities	0.002	0.006	0.298	0.766		
Awareness of consequences	-0.005	0.007	-0.681	0.496		
Climate change perception	0.000	0.001	-0.505	0.613		
Environmental values	0.001	0.012	0.117	0.907		
Benevolence	0.002	0.011	0.166	0.868		
Power	0.004	0.010	0.377	0.706		
Achievement	0.003	0.009	0.330	0.741		

Hedonism	-0.007	0.009	-0.801	0.423		
Gender	0.059	0.022	2.697**	0.007		
Age	0.013	0.009	1.483	0.138		
Education	0.044	0.013	3.349***	0.001		
Income	0.000	0.000	-0.171	0.864		
Number of people living in the house	-0.050	0.009	-5.917***	0.000		
Area of residence: Nord East	-0.116	0.032	-3.630***	0.000		
Area of residence: Centre	-0.093	0.025	-3.640***	0.000		
Area of residence: South	-0.110	0.028	-3.873***	0.000		
Area of residence: Islands	-0.054	0.039	-1.369	0.171		
Rented house	-0.006	0.030	-0.189	0.850		
Square metres of the house	-0.001	0.000	-2.961**	0.003		

SIGNIFICANCE: ***P < .001 **P <.01, *P<.05, † P<.1

APPENDIX 3: REGRESSION ANALYSES WITH DEPENDENT VARIABLE: LEVEL OF ENGAGEMENT (N=2042)

Model	β	SE	T-value	P-value	R^2	R^2 adj
Model 1					0.000	0.000
Personal norms	0.006	0.006	1.091	0.275		
Model 2					0.000	0.000
Environmental self-identity	-0.002	0.006	-0.377	0.706		
Model 3					0.002	0.000
Personal norms	0.008	0.006	1.223	0.221		
Ascription of responsibilities	0.004	0.007	0.498	0.618		
Awareness of consequences	-0.005	0.008	-0.651	0.515		
Climate change perception	0.000	0.001	0.005	0.996		
Environmental values	-0.015	0.021	-0.684	0.494		
Benevolence	-0.008	0.016	-0.505	0.613		
Power	0.011	0.014	0.773	0.440		
Achievement	-0.011	0.012	-0.904	0.366		
Hedonism	0.000	0.011	0.002	0.998		
Model 4					0.018	0.009
Personal norms	0.009	0.006	1.356	0.175		
Ascription of responsibilities	0.002	0.007	0.328	0.743		
Awareness of consequences	-0.002	0.008	-0.280	0.780		
Climate change perception	0.000	0.000	0.122	0.903		
Environmental values	-0.027	-0.003	-1.244	0.2138		
Benevolence	-0.004	0.016	-0.258	0.797		
Power	0.010	0.014	0.761	0.446		
Achievement	-0.006	0.013	-0.506	0.613		

Hedonism	0.007	0.012	0.569	0.570		
Gender	0.001	0.027	0.050	0.960		
Age	0.028	0.011	2.573**	0.010		
Education	-0.013	0.016	-0.801	0.423		
Income	-0.000	0.000	-0.277	0.782		
Number of people living in the house	-0.006	0.010	-0.586	0.558		
Area of residence: Nord East	0.081	0.038	2.147*	0.032		
Area of residence: Centre	-0.046	0.031	-1.485	0.138		
Area of residence: South	-0.042	0.035	-1.192	0.234		
Area of residence: Islands	-0.095	0.049	-1.955†	0.051		
Rented house	-0.000	0.000	-0.277	0.782		
Daily hours spent online	-0.014	0.010	-1.443	0.149		

SIGNIFICANCE: ***P < .001 **P <.01, *P<.05, † P<.1.

APPENDIX 4: PILOT TEST AND EXPERIMENT PROPOSED IN STUDY 2

PILOT TEST

Consent for Participation in Research Individual decision making study

Principal Investigator: Massimo Tavoni

This is a study being conducted by Politecnico di Milano under the research project COBHAM, funded by the European Research Council. We are studying individual decision making. We will use the information that our subjects provide in published articles or academic presentations, but no information regarding your personal identity or your involvement as a research subject will be published or revealed. Information collected during this study will be retained by these researchers and may be used in future research projects, but this information will not be linked to you in any way.

Participation is on a purely voluntary basis. Your participation in this study does not involve any physical risk or emotional risk to you beyond the risks of daily life. You will be asked to complete a survey. Your involvement in this experiment may benefit the field of economics by helping to advance theories about decision making. Your involvement in this study is appreciated, but you may omit responses to any questions that you wish, and you may quit participation altogether at any time without receiving any penalty. . Your compensation for successfully completing this survey will be £ 0.50.

If you have questions about this project, you may contact us at: massimo.tavoni@polimi.it.

If you have any questions about your rights as a participant in this research, you can contact the following office at Politecnico di Milano: comitatoetico@polimi.it. After you have reviewed the information provided above, please click on the "yes" button below if you wish to participate in this survey.

I consent to participate in this session, which will involve some questions. I understand that all data will be kept confidential by the researcher. My personal information will not be stored with the data. I am free to withdraw at any time without giving a reason. I consent to the publication of study results as long as the information is anonymous so that no identification of participants can be made.

1. Do you consent to participate in this study?

a. Yes
b. No

2. Which is your gender?
    a. Male
    b. Female
3. Which is your year of birth?
4. What is the highest educational level that you have attained?
    a. Primary school or lower
    b. Secondary school
    c. Bachelor's degree
    d. Postgraduate degree
5. Here is a list of monthly incomes. In what group your household is, counting all wages, salaries, pensions and other incomes that come in, net of taxes and other deductions?
    a. Less than £ 500
    b. From £ 500 to 1,000
    c. From £ 1,000 to 2,000
    d. From £ 2,000 to3,000
    e. From £ 3,000 to5,000
    f. From £ 5,000 to 7,000
    g. From £ 7,000 to10,000
    h. More than £ 10,000
6. Since everyone has different ideas about supporting environmental organisations, we are using this survey to understand individuals' behaviour in case they have the chance to choose whether to support or not one of them. Best known as the world's leading conservation body, WWF is active in safeguarding the natural world, tackling the global threat of climate change and helping people to change the way they live.

Do you think that supporting an environmental charity like WWF help contribute to address environmental issues?

a. Strongly agree
b. Somewhat agree
c. Neither agree nor disagree
d. Somewhat disagree
e. Strongly disagree

7. If you had the opportunity to donate part of your participation fee of this survey (£ 0.5) to WWF, how much would you donate?

   Note: we will NOT subtract the selected amount from your fee, it is a hypothetical decision.

   Donation in £:

EXPERIMENT

Consent for Participation in Research Individual decision making study

Principal Investigator: Massimo Tavoni

This is a study being conducted by Politecnico di Milano under the research project COBHAM, funded by the European Research Council. We are studying individual decision making. We will use the information that our subjects provide in published articles or academic presentations, but no information regarding your personal identity or your involvement as a research subject will be published or revealed. Information collected during this study will be retained by these researchers and may be used in future research projects, but this information will not be linked to you in any way.

Participation is on a purely voluntary basis. Your participation in this study does not involve any physical risk or emotional risk to you beyond the risks of daily life. You will be asked to complete a survey. Your involvement in this experiment may benefit the field of economics by helping to advance theories about decision making. Your involvement in this study is appreciated, but you may omit responses to any questions that you wish, and you may quit participation altogether at any time without receiving any penalty. Your compensation for successfully completing this survey will be £ 1. In addition, you will receive a bonus payment of maximum £1 depending on your decision.

If you have questions about this project, you may contact us at: massimo.tavoni@polimi.it. If you have any questions about your rights as a participant in this research, you can contact the following office at Politecnico di Milano: comitatoetico@polimi.it. After you have reviewed the information provided above, please click on the "yes" button below if you wish to participate in this survey.

I consent to participate in this session, which will involve some questions. I understand that all data will be kept confidential by the researcher. My personal information will not be stored with the data. I am free to withdraw at any time without giving a reason. I consent to the publication of study results as long as the information is anonymous so that no identification of participants can be made.

1. Do you consent to participate in this study?

a. Yes

b. No

2. Which is your gender?
    a. Male
    b. Female
3. Which is your year of birth?
4. What is the highest educational level that you have attained?
    a. Primary school or lower
    b. Secondary school
    c. Bachelor's degree
    d. Postgraduate degree
5. Here is a list of monthly incomes. In what group your household is, counting all wages, salaries, pensions and other incomes that come in, net of taxes and other deductions?
    a. Less than £ 500
    b. From £ 500 to 1,000
    c. From £ 1,000 to 2,000
    d. From £ 2,000 to3,000
    e. From £ 3,000 to5,000
    f. From £ 5,000 to 7,000
    g. From £ 7,000 to10,000
    h. More than £ 10,000
6. (TREATMENT 1) Which of the following environmental activities do you perform? Please indicate how often do you perform them.

	Always	Most of the time	About half of time	Sometimes	Never
I turn off the lights when no one is in the room					
I do not throw litter on the street					

I recycle newspapers, glass, aluminium, motor oil, or other items					
I turn off electrical appliances (to save energy)					
I move around by bike and/or public transportation					
I buy a less polluting product if there is a choice in the shop					
I use reusable shopping bags at grocery stores instead of the standard plastic or paper bags					
I leave a clean spot after a picnic					

7. (CONTROL) Which of the following activities do you perform? Please indicate how often do you perform them.

	Always	Most of the time	About half of time	Sometimes	Never
I read the newspaper					
I go to the theatre to watch drama					
I spend my weekend with my family and/or my friends					
I play multi-player online videogames					
I follow the precepts of my religion, if any					
I go to pubs/bars/clubs					
I share my experiences on social networks					
I listen to music on the radio					

8. Please indicate to what extent you agree with the following statements:

	Strongly agree	Agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Disagree	Strongly disagree
Acting pro-environmentally is an							

important part of who I am							
I am the type of person who acts in an environmentally-friendly way							
I see myself as an environmentally-friendly person							

9. (TREATMENT 2) Everyone has different ideas about supporting environmental causes. Especially, we are using this survey to understand individuals' attitudes toward environmental organisations.

   As part of this survey you will be asked whether you want to make a donation to WWF UK. Best known as the world's leading conservation body, WWF is active in safeguarding the natural world, tackling the global threat of climate change and helping people to change the way they live.

   Last week, we conducted a similar survey on Prolific: participants were willing to donate on average 40% of their bonus to WWF UK. Would you like to donate part of your participation bonus to WWF UK?

   Please enter a donation amount between 0£ and 1£. The donation will be subtracted from your bonus payment of 1£. We will send you a proof of donation by email.

   Donation in £: …

10. (CONTROL) Everyone has different ideas about supporting environmental causes. Especially, we are using this survey to understand individuals' attitudes toward environmental organisations.

    As part of this survey you will be asked whether you want to make a donation to WWF UK. Best known as the world's leading conservation body, WWF is active in safeguarding the natural world, tackling the global threat of climate change and helping people to change the way they live.

Would you like to donate part of your participation bonus to WWF UK?

Please enter a donation amount between 0£ and 1£. The donation will be subtracted from your bonus payment of 1£. We will send you a proof of donation by email.

Donation in £: ...

11. What is your preferred way to support social and environmental causes? Select all that apply.
    a. Volunteering/active membership in a charity
    b. Donating money to a charity
    c. Fundraising for a charity (e.g., organising a marathon)
    d. Sign a petition
    e. None
12. Which of the following best describes how often you give to charity?
    a. Weekly
    b. Monthly
    c. From time-to-time
    d. Rarely
    e. Never
13. Which of the following causes do you usually support? Select all that apply.
    a. Animal welfare
    b. Homeless and housing
    c. Overseas aid and disaster relief
    d. Hospital and hospices
    e. Physical and mental health care
    f. Environment
    g. Religious organisation
    h. Other
    i. None
14. When was the last time you donated to/volunteering for an environmental organisation?

a. Within the last 6 months
b. Within the last year
c. Between 2 and 5 years ago
d. Never

15. Now we will briefly describe some people. Would you please indicate for each description whether that person is very much like you, like you, somewhat like you, not like you, or not at all like you?

	Very much like me	Like me	Some-what like me	A little like me	Not like me	Not at all like me
It is important to this person to be rich; to have a lot of money and expensive things.						
It is important that every person in the world is treated equally; everyone should have equal opportunities in life.						
It is important to this person to show his/her abilities; to have people admire what this person does.						
It is important to this person to listen to people who are different from him/her; even in case of disagreement, this person wants to understand them.						
It is important to this person to have a good time; to "spoil" oneself.						
It is important to this person to help the people nearby; take care if their well-being.						
Being very successful is important to this person; to have people recognize one's achievements.						
It is important to this person to get respect from others; to make people do what this person says.						
It is important to this person to be loyal to friends; to devote to people close to him/her.						
This person strongly believes that people should care for nature. Looking after the environment is important to this person.						

This person seeks every chance to have fun; it is important to this person to do things that give pleasure.							

16. - Please indicate to what extent you agree with the following statements

	Strongly agree	Agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Disagree	Strongly disagree
I feel morally obliged to act in an environmentally-friendly manner							
I worry about the environmental impact of CO2 emissions caused by human activities							
I think it is useful to reduce CO2 emissions to reduce environmental problems							
I would feel guilty if I did not act in an environmentally-friendly manner							
Human activities cause serious environmental problems, such as climate change							
I would be a better person if I							

would act in an environmentally -friendly manner							
I think I can contribute to reduce environmental problems with my behaviours							

17. Listed below are statements about the relationship between humans and the environment. For each one, please indicate to what extend you agree with them.

	Strongly disagree	Mildly Disagree	Unsure	Mildly Agree	Strongly Agree
We are approaching the limit of the number of people the earth can support					
Humans have the right to modify the natural environment to suit their needs					
When humans interfere with nature it often produces disastrous consequences					
Human ingenuity will insure that we do NOT make the earth unliveable					
Humans are severely abusing the environment					
The earth has plenty of natural resources if we just learn how to develop them					
Plants and animals have as much right as humans to exist					
The balance of nature is strong enough to cope with the impacts of modern industrial nations					
Despite our special abilities humans are still subject to the laws of nature					

The so-called 'ecological-crisis' facing humankind has been greatly exaggerated					
The earth is like a spaceship with very limited room and resources					
Humans were meant to rule over the rest of nature					
The balance of nature is very delicate and easily upset					
Humans will eventually learn enough about how nature works to be able to control it					
If things continue on their present course, we will soon experience a major ecological catastrophe					

APPENDIX 5: REGRESSION ANALYSES WITH DEPENDENT VARIABLE: PERCENTAGE OF DONORS (N= 397)

Model	β	SE	T-value	P-value	R^2	R^2 adj
Model 1					0.055	0.052
Personal norm	0.099	0.021	4.781***	0.000		
Model 2						
Personal norm	0.099	0.030	3.356***	0.001		
SI	-0.042	0.230	-0.183	0.855		
Personal norm: SI	0.002	0.042	0.054	0.957		
Model 3					0.120	0.081
Personal norm	0.042	0.044	0.973	0.331		
Ascription of responsibilities	0.038	0.058	0.656	0.512		
Awareness of consequences	0.031	0.053	0.582	0.561		
New Environmental Paradigm	-0.064	0.079	-0.812	0.417		
Environmental values	0.042	0.099	0.417	0.677		
Benevolence	-0.132	0.076	-1.748†	0.081		
Power	-0.089	0.084	-1.063	0.289		
Achievement	-0.101	0.072	-1.416	0.158		
SI	-0.050	0.280	-0.177	0.860		
Personal norms: SI	-0.047	0.063	-0.746	0.456		
Ascription of responsibilities: SI	0.070	0.082	0.860	0.391		
Awareness of consequences: SI	-0.030	0.075	-0.399	0.690		
New Environmental Paradigm: SI	0.090	0.116	0.780	0.436		
Environmental values: SI	0.063	0.147	0.429	0.668		
Benevolence: SI	-0.004	0.109	-0.041	0.967		
Power: SI	0.035	0.118	0.299	0.765		

Achievement: SI	0.064	0.100	0.635	0.526		
Model 3					0.132	0.083
Personal norm	0.038	0.044	0.859	0.391		
Ascription of responsibilities	0.040	0.058	0.687	0.493		
Awareness of consequences	0.028	0.053	0.528	0.598		
New Environmental Paradigm	-0.052	0.080	-0.654	0.513		
Environmental values	0.056	0.100	0.563	0.573		
Benevolence	-0.102	0.078	-1.310	0.191		
Power	-0.077	0.085	-0.907	0.365		
Achievement	-0.113	0.072	-1.565	0.118		
SI	-0.033	0.281	-0.119	0.905		
Gender	0.037	0.052	0.707	0.480		
Age	0.004	0.003	1.468	0.143		
Education	0.024	0.033	0.711	0.478		
Income	-0.018	0.014	-1.290	0.198		
Personal norms: SI	0.044	0.147	0.297	0.766		
Ascription of responsibilities: SI	-0.020	0.109	-0.182	0.856		
Awareness of consequences: SI	0.017	0.118	0.146	0.884		
New Environmental Paradigm: SI	0.065	0.101	0.645	0.519		
Environmental values: SI	0.090	0.116	0.771	0.441		
Benevolence: SI	-0.033	0.075	-0.433	0.665		
Power: SI	0.063	0.082	0.774	0.440		
Achievement: SI	-0.038	0.064	-0.603	0.547		
Model 4					0.079	0.072
Personal norm	0.101	0.032	3.219***	0.001		

SN	0.173	0.230	0.751	0.453		
Personal norm: SN	-0.004	0.042	-0.084	0.933		
Model 5					0.143	0.104
Personal norm	0.018	0.048	0.382	0.703		
Ascription of responsibilities	0.046	0.059	0.781	0.435		
Awareness of consequences	0.041	0.052	0.804	0.422		
New Environmental Paradigm	-0.009	0.081	-0.105	0.917		
Environmental values	0.119	0.097	1.224	0.222		
Benevolence	-0.139	0.070	-1.989*	0.047		
Power	-0.032	0.078	-0.404	0.686		
Achievement	-0.035	0.068	-0.521	0.603		
SN	0.046	0.278	0.166	0.868		
Personal norms: SN	0.011	0.064	0.170	0.865		
Ascription of responsibilities: SN	0.046	0.082	0.561	0.575		
Awareness of consequences: SN	-0.042	0.076	-0.555	0.579		
New Environmental Paradigm: SN	-0.013	0.115	-0.113	0.910		
Environmental values: SN	-0.118	0.143	-0.826	0.410		
Benevolence: SN	0.031	0.111	0.277	0.782		
Power: SN	-0.071	0.117	-0.607	0.545		
Achievement: SN	-0.080	0.100	-0.803	0.423		
Model 6					0.155	0.107
Personal norm	0.022	0.048	0.462	0.645		
Ascription of responsibilities	0.047	0.059	0.785	0.433		
Awareness of consequences	0.039	0.052	0.747	0.456		
New Environmental Paradigm	-0.009	0.081	-0.113	0.910		

Environmental values	0.117	0.097	1.203	0.230		
Benevolence	-0.122	0.072	-1.701†	0.090		
Power	-0.033	0.079	-0.415	0.678		
Achievement	-0.050	0.068	-0.730	0.466		
Gender	0.034	0.051	0.663	0.508		
Age	0.003	0.003	1.286	0.199		
Education	0.037	0.033	1.122	0.263		
Income	-0.020	0.013	-1.480	0.140		
SN	0.115	0.280	0.411	0.681		
Personal norms: SN	0.000	0.064	-0.006	0.996		
Ascription of responsibilities: SN	0.041	0.082	0.501	0.616		
Awareness of consequences: SN	-0.042	0.076	-0.554	0.580		
New Environmental Paradigm: SN	0.014	0.116	0.120	0.905		
Environmental values: SN	-0.107	0.143	-0.748	0.455		
Benevolence: SN	0.033	0.112	0.294	0.769		
Power: SN	-0.065	0.117	-0.550	0.582		
Achievement: SN	-0.076	0.100	-0.764	0.445		

SIGNIFICANCE: ***P < .001 **P <.01, *P<.05, † P<