Norwegian University
of Life Sciences

Master's Thesis 2019 30 ECTS
Faculty of Landscape and Society

The Use of Information as a Policy Instrument to Encourage Climate Relevant Behaviour on an Individual Level in the UK

Emma James
International Environmental Studies

The Department of International Environment and Development Studies, Noragric, is the international gateway for the Norwegian University of Life Sciences (NMBU). Established in 1986, Noragric's contribution to international development lies in the interface between research, education (Bachelor, Master and PhD programmes) and assignments.

The Noragric Master's theses are the final theses submitted by students in order to fulfil the requirements under the Noragric Master's programmes 'International Environmental Studies', 'International Development Studies' and 'International Relations'.

ejames28555@gmail.com

Noragric

Department of International Environment and Development Studies

The Faculty of Landscape and Society

P.O. Box 5003

N-1432 Ås

Norway

Tel.: +47 67 23 00 00

Internet: https://www.nmbu.no/fakultet/landsam/institutt/noragric

Declaration

I, Emma James, declare that this thesis is a result of my research investigations and findings. Sources of information other than my own have been acknowledged and a reference list has been appended. This work has not been previously submitted to any other university for award of any type of academic degree.

Signature:……..

Date: 14/05/2019

Acknowledgements

I would like to thank Arild Vatn, the acting supervisor on this project. Arild's continuous support, feedback and ideas were extremely helpful and appreciated in the creation of this project. I would like to thank Karen Anderson, Josh Thompson, and Sue Harrison at the Pioneer Centre, Cleobury Mortimer, for kindly organising and providing the venue for the focus groups to take place. The venue was a perfect location to gather the data needed for the project. I would like to thank David Howard from Stretton Climate Care for kindly agreeing to provide the normative information during the focus groups. The information David provided was crucial for this research. Finally, I would like to thank all 25 participants for taking part in this research. Your participation was vital for creating a research project that aims to provide valuable data to use in crucial policy mitigation efforts to tackle climate change.

Abstract

Household consumption behaviours in the UK are contributing to the greenhouse gas emissions driving the climate crisis. Policies in the UK implement climate change mitigation efforts; however, these instruments are often unable to influence a behaviour change. This project aims to investigate the use of information as a policy instrument to encourage climate relevant behaviour on an individual level in the UK. The research will investigate barriers, impact and normative information disclosure, and communication within a group as potential influencing aspects for adopting climate relevant behaviour. The institutional theory, the norm activation theory, the functional theory, and the deliberative democratic theory will be used to understand the influence of these aspects. Focus groups were the main data collection method, along with a commitment strategy for participants to decide to adopt climate relevant behaviours. Four of the focus groups presented impact information and two of the focus groups presented both impact and normative information. Follow-up focus groups and questionnaires were used to assess participant experiences. In total, 25 participants took part in this investigation. All 25 participants committed to adopt climate relevant behaviours. The barriers identified and the perceptions of the information seem to be influenced by individual preferences, moral obligations to act promoted by personal norms, and preferences of other individuals. The majority of participants experienced barriers, the most significant being the social (family) barriers. Perceptions of the impact and normative information were mixed among participants. However, normative information was not perceived as confusing and seemed to be more engaging than the format of impact information. Communication within the group and the group setting itself seemed to have the most significant influence because of discussion and pressure within the group stimulating moral obligations and motivations to act. It is suggested that combining group communication with relatable normative information could form an appropriate policy instrument to encourage climate relevant behaviour on an individual level in the UK.

Key Words: Climate relevant behaviour, policy instrument, impact information, normative information, focus groups, institutions, norm activation, communication

Table of Figures and Tables

Figures

Tables

Table of Contents

1 Introduction

Climate change and the resulting impacts are linked to unsustainable human behaviour and consumption (Schultz, 2002). Specifically, anthropogenic actions in the Northern Hemisphere have contributed to an unprecedented rise in carbon dioxide emissions and increased earth surface temperatures (Intergovernmental Panel on Climate Change (IPCC), 2013). Despite occasional disagreement in society, a consensus has formed regarding the destructive influence of anthropogenic behaviour on the climate (Whitmarsh, 2011). The destructive influences of human behaviour can be explained using theories of human action discussed by Vatn (2015). Vatn (2015) uses the theories of individual rationality, social rationality, habits, and bounded rationality and satisficing to explain human action motivations. Individual rationality highlights individual preference and satisfaction as drivers of human action compared to social rationality highlighting moral obligation and social appropriateness as drivers of human action (Vatn, 2015). In addition, habitual behaviour as automatic actions and bounded rationality and satisficing as developing tractable decisions and setting targets are alternative theories of human action (Vatn, 2015). Understanding these motivations of human behaviour is necessary to develop mitigation efforts that encourage wide conformity to slow down or stop the catastrophic influence of human action on climate change.

In order to achieve success in climate change mitigation efforts, everyone must conform meaning individual behaviour needs to be targeted for change. Unfortunately, several barriers have built up to separate environmental concern with physical action (Kollmuss & Agyeman, 2002). Barriers to environmental action often relate to the social dilemma of contrasting perceptions among individuals regarding obligations to act as well as who is responsible to act in order to achieve the gains of environmental protection for everyone. To overcome barriers and establish motivation on an individual level, policy makers have implemented policies aiming to reduce greenhouse gas emissions resulting from human action (Whitmarsh, 2011). For example, the United Kingdom (UK) have committed to cutting greenhouse gas emissions by 80% by the year 2050 under the Climate Change Act 2008 (Whitmarsh, 2011). However, over time studies have indicated poor public engagement in environment policies. For example, in 2000, Owens indicated that public involvement in sustainability strategies was essential but challenging. In addition, in 2007, Lorenzoni, Nicholson-Cole, and Whitmarsh highlighted that there was limited attention given to encouraging changes to human action because climate change is a low priority issue in policy-making. Therefore,

policy instruments must be improved in order to achieve a wider engagement in climate change mitigation at the individual level.

Various policy instruments have been developed to tackle climate change. Policy instruments are "tools that can be used to change the behaviour or shape the performance of an actor or a target group so that they better contribute to economic, social or environmental objectives" (Gouldson et al., 2008, p. 360). In the past 15 years, market-based policy instruments have become more prominent, involving the use of constraints or taxes on pollutions (Dietz & Stern, 2002). Furthermore, different types of UK policy instruments were categorised by Gouldson et al., (2008); information-based instruments such as labels added to products, private and voluntary regulations such as civic regulation, and capacity building measures such as joint problem solving. With the variety of policy instruments in use, it is interesting to identify the effectiveness of different instruments in promoting climate change mitigation. The UK Sustainable Development Strategy suggests that policy instruments need to engage individuals, enable change, encourage change, and ensure standards are met to facilitate change in human action (Gouldson et al., 2008). Therefore, a successful policy cycle should introduce a policy instrument that engages, enables, encourages and ensures standards among individuals, leading to influenced human actions and attitudes.

The policy instrument under investigation in this research project is information. Information provision suggests informing individuals with "just the facts" about environment issues (Dietz & Stern, 2002, p.5). However, information used as a policy instrument involves "provision of information in a systematic and structured way, but usually goes further, encouraging deeper understanding and, perhaps, values and norms regarding behaviors" (Dietz & Stern, 2002, p.5). Information as a policy instrument is already utilised in policy-making but has a low impact on behaviour change at the individual level (Lorenzoni et al., 2007). This may be because little is known about how to achieve the education and information policy goals (Wilbanks & Stern, 2002). The policy instrument of information should aim for a policy cycle whereby information leads to increased awareness and knowledge, leading to a change in attitude and then to the goal of appropriate human action. As individuals have a right to remain informed by governments, the information disclosed should be utilised to increase awareness of climate change, change attitudes towards climate change and ultimately lead to action from individuals to tackle climate change (Wilbanks & Stern, 2002). Therefore, it is important to study this policy instrument because it is a tool

used by governments thus it should be investigated to find out how information can more effectively encourage change in human action to tackle climate change.

This study will investigate the use of information to encourage pro-environmental behaviour on an individual level, specifically the behaviour that is relevant to mitigating climate change referred to as climate relevant behaviour. Pro-environmental behaviour is "behavior that consciously seeks to minimise the negative impact of one's actions on the natural and built world" (Kollmuss & Agyeman, 2002, p. 240). As a subcategory, climate relevant behaviour therefore consciously seeks to minimise one's actions on climate change. This research project will focus on two different formats of information and communication within a group to investigate if information format and communication method have an influence on the effectiveness of information to encourage climate relevant behaviour.

Specifically, the formats of impact information and normative information will be investigated alongside the communication within a group setting using focus groups. As different people rely on different contents of information to believe and trust, the research will further examine the potential of impact information and normative information to influence behaviour (Malka, Krosnick, & Langer, 2009). Impact information refers to "individual's beliefs about the consequences" of certain actions (Schultz, 2002. p. 70). Impact information increases awareness of the resulting effects of certain behaviours on the environment in the attempt to motivate climate relevant behaviour choices. In addition, normative information identifies "the beliefs about the behaviors of others" (Schultz, 2002, p. 70) and provides information on how others act in the attempt to influence how individuals feel they should also act as a result of perceived moral obligations.

The impact and normative information will be communicated during focus groups. This will examine the effectiveness of group communication to enable understanding and deliberation of information in the attempt to encourage climate relevant behaviour among individuals. In addition, focal barriers to adopting climate relevant behaviour will be investigated to identify any challenges to behaviour change that policy makers may need to take into account when implementing information-based policy instruments.

The barriers to climate relevant behaviour choices may be influenced by the study location of this research project. The effect of using information as a policy instrument will be

researched in the UK. The UK is an interesting case to focus on because the current political climate surrounding Brexit (the UK's exit from the European Union) creates complications with the policies tackling climate change but may also provide opportunities for developing or improving climate policies (Hepburn & Teytelboym, 2017). Therefore, investigating the effectiveness of information as a policy instrument in the UK could be useful in the aftermath of Brexit if opportunities for improved climate policies do arise. Furthermore, it has been suggested that the UK target of an 80% reduction in greenhouse gas emissions by 2050 may be difficult to achieve as a result of the potential disruption to climate policies due to Brexit (Farstad, Carter, & Burns, 2018). Therefore, in order to achieve the 2050 target, effective policy instruments need to be utilised to encourage action in the UK.

As well as the challenges posed by Brexit, similarly to other countries the UK has existing high carbon footprints from households. Focusing the study on the UK is worthwhile as a change is already needed, regardless of the additional challenges posed by the unstable political climate. For example, Druckman and Jackson (2010a) found that the UK households emit over three quarters of total UK carbon emissions and the carbon footprint for an average household was approximately 26tCO_2e in 2004. The significance of the emissions coming from households suggests a need to focus attention on encouraging action among citizens of the UK in households. Policy instruments need to shift behaviour patterns towards living climate consciously which is a process deemed difficult by policy makers (Druckman & Jackson, 2010b). Therefore, the difficulty with encouraging climate relevant behaviour change among individuals, the problems with high household greenhouse gas emissions, and the challenges to climate policy posed by Brexit indicate the UK as a worthwhile study location to investigate policy instruments to encourage the adoption of climate relevant behaviour at the individual level.

Specifically, the counties of Shropshire and Worcestershire in the West Midlands of the UK will be the focal study location. These counties were chosen for the logistical reasons of accessibility making participant samples similarly accessible. Despite the counties being chosen for logistical reasons, they provide a relevant and interesting study location because these counties contain a significant portion of rural area. Living in a rural area poses various challenges to adopting climate relevant behaviour that may not be faced when living in urban areas. Therefore, the personal circumstance of living in a rural area will be an interesting factor to analyse in this research. As studied by Minx et al., despite higher carbon emissions

being associated with urban areas, “high carbon lifestyles” are connected to both urban and rural areas in the UK (2013, p. 8). Therefore, adding to research on policy instruments to encourage behaviour change in rural areas will be relevant.

This research will aim to achieve the objectives of; an increased understanding of the barriers to climate relevant behaviour faced by individuals, to establish if information disclosure in the formats of impact information and normative information is a successful instrument for motivating individuals to change their behaviour, and if the method of communicating within a group setting influences the policy instrument’s success. In order to achieve these objectives, three research questions have been formulated;

- What are the focal barriers for individuals adopting climate relevant behaviour?
- How does the promotion of impact information and normative information alter and influence willingness to adopt climate relevant behaviour?
- How does the communication within a group setting influence the decision to adopt climate relevant behaviour?

With the aim of answering these research questions, this research project will investigate the use of information as a policy instrument to encourage climate relevant behaviour on an individual level in the UK.

2 Topical Background

Climate change is a process of environmental change that is affecting natural and social systems on a global level. Natural and anthropogenic induced changes disturb the earth's radiation which creates radiative forcing affecting the earth's climate (IPCC, 2013). Climatic changes are indicated by many processes such as surface temperature fluctuations and extreme weather events. For example, the IPCC (2018) stated that a continuous increase in global temperature at the current rate will reach a surface temperature increase of 1.5°C between 2030 and 2052. This will result in various impacts such as the continued rise in sea level, and pressure on diverse ecosystems, thus the ecosystem services they provide to society (IPCC, 2018).

Another key indicator of climate change is increased greenhouse gas concentrations. These gases are a significant driver of climate change, the most common being carbon dioxide, methane, and nitrous oxide (IPCC, 2013). Human action is a significant cause of increased greenhouse gas concentrations indicating the immense effect of anthropogenic activity as a driver of climate change. For example, the IPCC stated, "human activities are estimated to have caused approximately 1.0°C of global warming above pre-industrial levels" (2018, p. 6). Human activities including energy consumption, agricultural activities and transport use contribute to the increasing greenhouse gas emissions in the atmosphere indicating that anthropogenic drivers of climate change must be mitigated.

Focusing on the UK, the human actions within the country produce vast amounts of greenhouse gas emissions. However, the Department for Business, Energy & Industrial Strategy (BEIS) (2019) has indicated that emission reductions have occurred. In 2018, carbon dioxide emissions in the UK were estimated at 364.1 Mt which is 43.5% lower than the total in 1990 and 2.5% lower than the total in 2017 (BEIS, 2019). Despite this decrease, total carbon emissions are still significant and in need of improvement from changes to human action, with carbon dioxide making up 81% of total UK greenhouse gas emissions (BEIS, 2019). Total UK greenhouse gas emissions are divided into sectors and generally emissions decreased between 2017 and 2018 in most sectors (BEIS, 2019). However, a 2.8% increase in carbon dioxide emissions in the residential sector offset this decreasing pattern, equaling 18% of total UK carbon dioxide emissions in 2018 (BEIS, 2019). In addition to this, the public

sector totalled 8.1 $MtCO_2e$, the agricultural sector totalled 5.6 $MtCO_2e$, and the transport sector totalled 121.4 $MtCO_2e$ in 2018 (BEIS, 2019). Therefore, the total greenhouse gas emissions, specifically the increase in emissions in the residential sector, indicate that improving policy instruments to encourage climate relevant behaviour in order to reduce household emissions is needed.

Policy instruments aiming to encourage climate relevant behaviour must aim to change attitudes of individuals to establish a successful policy cycle. Corner, Whitmarsh, & Xenias indicated that various factors influence attitudes including "perceived reliability of the source, the level of personal involvement an individual has with a particular issue, and personality characteristics such as the degree to which people are 'open to change'" (2012, p. 466). Therefore, for attitude change to occur and result in an adoption of climate relevant behaviour among individuals, policy instruments must indicate reliability, relevance to the individual and be motivating enough for individuals to want to change.

Climate change impacts are often complex and non-immediate which creates a lack of willingness to act to tackle the issue (Kollmus & Agyeman, 2002). Nonetheless, access to knowledge and information should encourage behavioural adjustments towards climate relevant actions (Jensen, 2002). This is because "knowledge is commonly seen as a necessary pre-condition for a person's behavior" (Frick, Kaiser, & Wilson, 2004, p. 1597). Access to such knowledge and information should motivate individuals to behave environmentally responsibly because of an increased awareness of the consequences of climate change (Vicente-Molina, Fernández-Sáinz, & Izagirre-Olaizola, 2013). This gap between climate relevant actions and a possession of information leading to awareness and attitude change highlights a need for further research into the ability of impact and normative information to inform individuals effectively in order to encourage a willingness to adopt climate relevant behaviour (Sheppard, 2005).

Impact information will be examined to see if this information can influence the attitudes of individuals towards viewing climate relevant behaviour as correct by highlighting the consequences of certain behaviours (Aasen & Vatn, 2018). In addition, normative information will be examined to see if this information can adjust attitudes towards the attitudes of other individuals who perceive climate relevant behaviour as correct behaviour (Aasen & Vatn, 2018).

Alongside analysing the ability of information disclosure to influence attitudes, barriers associated with adopting climate relevant behaviour and communication within a group setting will be analysed. As stated by Moser and Ekstrom (2010), identifying significant barriers increases the ability to allocate the resources needed to overcome challenges. Barriers could relate to the cost of taking up certain behaviours or perhaps the social dilemma often challenging climate change mitigation efforts. The social dilemma refers to contrasting perceptions of the moral obligation to act climate consciously as well as individuals not viewing their actions as significant, therefore leaving the mitigation efforts for someone else but enjoying the gains from the actions of others. For example, the free rider problem highlights the situation whereby individuals do not want to act as the cost of behaving in certain ways falls on the individual but the gains of climate relevant behaviour fall on everyone else. In addition, identifying effective methods to communicate information will help to identify how information is best understood and deliberated on in order to influence behaviour choices. Thus, associated barriers, impact information, normative information, and group communication will be examined to analyse if information is an effective policy instrument to encourage climate relevant behaviour.

3 Theoretical Framework

3.1 The Theoretical Framework

Informational strategies have been emphasised in previous studies as attempts to change attitudes and increase awareness of behaviour that will impact the environment (Steg & Vlek, 2009). The format of these informational strategies will influence the success of information as a policy instrument (Pichert & Katsikopoulos, 2008).

A theoretical framework consisting of four corresponding theories will be used to examine the use of impact and normative information as policy instruments to encourage climate relevant behaviour. The corresponding theories are; the institutional theory proposed by Vatn in 2015, the norm activation theory proposed by Schwartz in 1977, the functional theory adopted for communication studies by Gouran and Hirokawa (1983) (as cited in Waldeck, Shepard, Teitelbaum, Farrar, & Seibold, 2002), and the deliberative democratic theory influenced by Habermas (1979) (as cited in Kelly, 2004). Vatn (2015) explores theories of human action to examine what motivates human behaviour. Theories of human action explore contrasting approaches including individual theories such as the theory of individual rationality theorising human choices as predominantly about the individual (Vatn, 2015). The institutional theory is the contrasting branch to human action theorising human action as influenced by social rationality or individual rationality as a result of socially constructed institutions.

The institutional theory indicates the influence of the social construction of norms, conventions and formally sanctioned rules on human action (Vatn, 2015). The institutional theory focuses on institutions as rationality contexts that socially construct social rationality and cooperation but can also reinforce individual rationality and egoism (Vatn, 2015). The rationality reinforced depends on social norms becoming personal norms among individuals through institutionalisation (Vatn, 2015). Personal norms are also a key part of the norm activation theory as motivators for behaviour change. Schwartz defines personal norms as "expectations, obligations and sanctions" originally acting as social norms when they were developed from social interaction and "anchored in the social group" but became "anchored in the self" to form personal norms (1977, p.223).

The institutional theory will be focused on as the overarching theory for this research project. This is because behaviour choice is key to the investigation and perceptions of behaviour will be central to measuring successful policy instruments. In addition, information disclosure will be communicated within a group setting suggesting that the social construction of personal norms, values and expectations within the group will influence participant perceptions. Moreover, action among the participants will be influenced by balancing individual preferences alongside social responsibility. The complimentary theories of the norm activation theory, the functional theory, and the deliberative democratic theory will be linked to the overarching institutional theory, allowing for research into the use of normative and impact information and group communication within a focus group setting. These four complimentary theories form the theoretical framework for this research study (Figure, 1).

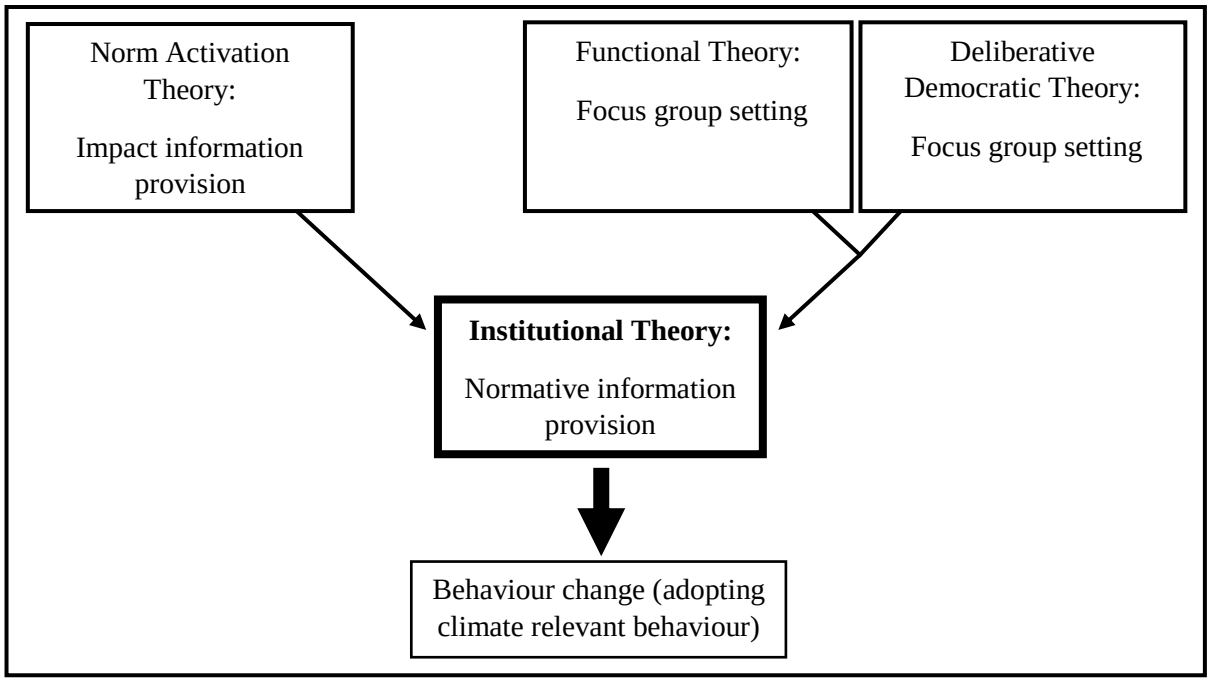


Figure 1: The theoretical framework used in this research study (the framework combines four existing theories; the institutional theory proposed by Vatn (2015), the norm activation theory proposed by Schwartz (1977), the functional theory adopted by Gouran & Hirokawa (1983) (as cited in Waldeck et al., 2002), and the deliberative democratic theory influenced by Habermas (1979) (as cited in Kelly, 2004))

Figure 1 highlights the link between each theory and the influencing aspects being analysed using the theories. It is estimated, using this theoretical framework, that these influential aspects of the research and the analysis from the corresponding theories will explain the adoption of climate relevant behaviour among individuals. Further detail will now be provided on the different theories forming the framework in Figure 1.

3.2 Institutional Theory

Institutions constructed by humans are "the conventions, norms and formally sanctioned rules of society. They provide expectations, stability and meaning essential to human existence and coordination. Institutions support certain values, and produce and protect specific interests" (Vatn, 2015, p. 78). Institutions establish social norms, and the institutionalisation process of conventions, norms and formally sanctioned rules internalises social norms into personal norms. To define the concept of institutions further, conventions "combine certain situations with a certain act, solution or understanding" (Vatn, 2015, p. 79). Conventions ensure coordination by promoting coordinated interactions (Vatn, 2015). In addition, norms "combine certain situations with a required act or solution that supports an underlying value" (Vatn, 2015, p. 81). Norms indicate how one should behave in society through the social construction of values. Leading on, formally sanctioned rules "combine a certain situation with an act that is required or forbidden and that is governed by third party sanctioning" (Vatn, 2015, p. 82). Therefore, institutions create a coordination of behaviour if everyone adopts the conventions, norms, and formal rules of society. Personal norms internalised through institutions influence individual choice to adhere to these institutions.

The institutional theory explains institutions as rational contexts (Vatn, 2015). Institutions emphasise social rationality meaning individuals form an understanding of what is right and wrong in society and act in ways that are deemed socially appropriate by the individual (Vatn, 2015). Norms promote an obligation to act for the benefit of society. On the other hand, institutions also emphasise individual rationality meaning individuals act with personal intent and personal preference (Vatn, 2015). Therefore, the construction of institutions influences the moral behaviour of individuals making up a collective society. Institutions can influence a coordinated society with individuals adopting behaviours that benefit the collective rather than the individual, creating stability among social groups. Alternatively, society could be an uncoordinated, unstable system met with individual intent and preference, with individuals adopting behaviours that ensure individual satisfaction. The contrasting moral obligations promoted by norms and the personal satisfaction promoted by individual preferences creates an individual dilemma experienced by individuals making up a society. In addition, the contrast between norms and other individual's preferences often creates a social dilemma as obligations acted on by some individuals may go against the preferences of others.

This research investigates the use of normative information disclosure to influence behaviour among individuals. The normative information focuses on communicating descriptive norms which are defined by Nolan, Schultz, Cialdini, Goldstein, and Griskevicius as "how most people behave in a given situation" (2008, p.913). Institutions influence human action deemed by individuals as the correct way to act in society through internalised personal norms. The normative information promotes this influence by highlighting the descriptive norms of how others adopt climate relevant behaviour. This may influence individuals to adopt the same behaviours as they are morally appropriate, however individual preferences may cause individuals to choose not to adopt these behaviours. Therefore, institutions may affect the power of normative information to influence behaviour among individuals.

The use of normative information disclosure attempts to influence individual's attitudes to perceive climate relevant behaviour as morally appropriate and beneficial for society. However, it may also result in instability in society if institutions emphasise individual rationality and the resulting individual preferences of individuals. This may result in individuals perceiving climate relevant behaviour as non-beneficial to an individual's satisfaction therefore; the behaviour may not be adopted as individual intent prevails over collective social benefits. Despite this possibility, normative information will be researched to examine if descriptive norms regarding how others act to reduce greenhouse gas emissions have power in persuading others to coordinate. If a collective of individuals adopt climate relevant behaviour because it is socially appropriate to do so, institutions may signal this behaviour as the correct way to act in certain situations, motivating others to coordinate with this moral behaviour (Vatn, 2009).

The influence of normative information to promote a moral obligation to act has been studied by, Nolan et al., (2008) to investigate if descriptive norms encourage individuals to engage with climate relevant behaviour, specifically relating to energy conservation. The study by Nolan et al., (2008) is similar to this research project as the normative information provided in this study also focuses on communicating descriptive norms regarding how residents of a neighbouring town behave in situations that lend to living more climate consciously. Nolan et al., (2008) found that descriptive norms encouraged participants to adopt energy conservation behaviours despite participants perceiving this normative information as having low impact on their behaviour choices (Nolan et al., 2008).

On the other hand, Hurlstone, Lewandowsky, Newell, and Sewell (2014) conducted a study into normative information and found contradicting results to those of Nolan et al., (2008). The study investigated the extent to which citizens of Australia would feel motivated to reduce their emissions (Hurlstone et al., 2014). The normative information indicated other countries' emissions and did not result in encouraging more individuals to reduce their emissions (Hurlstone et al., 2014). Therefore, this research will build on the existing research to identify if normative information does in fact motivate an adoption of climate relevant behaviour and will refer to the institutional theory to investigate the reasons behind the potential influential power of information disclosure.

3.3 Norm Activation Theory

The norm activation theory is used as a complimentary, secondary theory linked to the institutional theory. The theory, originally proposed by Schwartz, indicates that awareness of consequences, and ascription of responsibilities activate existing personal norms which leads to influenced pro-social behaviour or in the case of this study; climate relevant behaviour (Harland, Staats, & Wilke, 2007). This indicates a link to the institutional theory and the promotion of internalised personal norms through institutionalisation, which emphasises moral behaviour. The norm activation theory is being used in this study to examine the potential motivation of impact information to encourage climate relevant behaviour.

The factors that lead to the activation of personal norms highlight the potential ability of impact information to motivate the adoption of climate relevant behaviour. Awareness of consequences highlights the awareness of an individual to situations that need attention or change. For instance, Harland et al., (2007) explain this awareness as an individual being aware of an environment that is degrading and in need of attention. Having awareness of consequences suggests one is aware of the negative impacts of human action that is not climate relevant (De Groot & Steg, 2009). Leading on, ascription of responsibility refers to an individual feeling responsible for the situation that needs attention or change (Harland et al., 2007). An individual feels or denies responsibility of the impacts faced by society by not acting climate relevantly (De Groot & Steg, 2009).

Existing personal norms activated by the awareness of consequences and the ascription of responsibility are a key part of the norm activation theory acting as drivers of behaviour

choices. As previously defined, personal norms are constructed by individuals and act as perceived expectations of how individuals feel they should act in situations (Schwartz, 1977). Schwartz (1977) identifies that personal norms differ among individuals, therefore, what some individuals perceive as the correct way to act, may be perceived by others as the wrong way to act, indicating a social dilemma. Individuals often behave in ways they perceive as appropriate but understand that others may expect them to act differently (Schwartz, 1977). However, when awareness of consequences and ascription of responsibility are low, personal norms are unlikely to encourage the adoption of desirable behaviour (De Groot & Steg, 2009). Therefore, the use of impact information aims to increase awareness of consequences and ascription of responsibility to activate personal norms and induce an adoption of climate relevant behaviour.

The norm activation theory is being included as a secondary theory because the idea of personal norms being activated by awareness of consequences and ascription of responsibility can link to the discussion of norms and individual preferences within the institutional theory. The norm activation theory can be used to further explain the effect of personal norms on individuals' motivation to adopt climate relevant behaviour. Awareness of consequences among individuals and potentially the resulting ascription of responsibility is increased in this research by the disclosure of impact information. The impact information highlights greenhouse gas emission consequences of various daily, domestic behaviours carried out by individuals, thus the norm activation theory is used to explain the potential influence of the impact information to activate personal norms and encourage the adoption of climate relevant behaviour.

The use of impact information to encourage a behavioural change has been less extensively studied in literature when compared to normative information, however, the norm activation theory has been used extensively to understand behaviour choices in previous studies. Schultz (2002) conducted a study investigating the use of impact information as a tool to influence behaviour. The study suggested that impact information could be a successful tool as it combines beliefs, values and norms to determine behaviour (Schultz, 2002). Therefore, the norm activation theory is an appropriate theory to examine the influence of impact information because the beliefs, values and norms promoted by impact information could motivate a behaviour change by activating similar existing beliefs, values and norms held by individuals. On the other hand, Stern states that informing individuals using "moral

and educational approaches have generally disappointing track records" when these approaches are used alone (2000, p. 419). Therefore, increasing awareness of consequences may not be enough to influence a change in attitude among individuals. This research study will aim to investigate the effect of impact information on encouraging climate relevant behaviour to examine if increasing awareness of consequences and ascription of responsibility is adequate to change attitudes. The effect of impact information will be examined using the norm activation theory to understand the potential of this information to encourage climate relevant behaviour.

3.4 Communication Theories

The functional theory and the deliberative democratic theory will also be applied as complimentary, secondary theories in order to delve into the effect of communication within a group to discuss, understand and deliberate on the impact and normative information. The functional theory will examine the effect of group communication on understanding and interpreting the information provided. The influence of group communication on understanding the consequences of behaviours may influence the ability of the impact information to activate personal norms. In addition, the deliberative democratic theory will examine the process of deliberation of personal norms and descriptive norms promoted by the normative information when considering to adopt climate relevant behaviour.

Gouran and Hirokawa (1983) adopted the functional theory for communication studies (as cited in Waldeck et al., 2002). The theory highlights that decision-making within groups is affected by the function of communication within the group context (Waldeck et al., 2002). When deciding on a choice within a group, communication should function to ensure individuals correctly understand any issues, and relevant alternatives can be recognised (Waldeck et al., 2002). In addition, the functional theory states that group communication should function to limit any constraints to completing tasks (Waldeck et al., 2002). For example, whilst decision-making, communication should allow individuals within the group to identify potential obstacles to tasks and should help to overcome challenges (Waldeck et al., 2002).

The impact and normative information were communicated during focus groups in this research. For the impact information to be motivational, participants must have been able to understand and interpret the consequences of behaviours highlighted by the information, and

understand any potential constraints and barriers to adopting climate relevant behaviour. The ability to understand and interpret the impact information may have affected the activation of personal norms among individuals. Leading on, during the focus groups participants had the opportunity to choose climate relevant behaviour commitments. The communication within the group may have affected these decisions made by participants. The influence of group communication on the perceptions of impact information will be investigated using the functional theory to identify if the communication process influenced understanding of the information and the activation of personal norms. The communication process will be examined to see if participants could successfully understand and interpret the information, could identify potential issues and obstacles related to adopting climate relevant behaviour, could identify potential alternative behaviours to commit to, and could identify potential methods to overcome any challenges faced in order to make informed decisions to adopt climate relevant behaviour.

Alongside the functional theory, the deliberative democratic theory will also be used to examine the effect of group communication on perceptions of the normative information. The deliberative democratic theory was influenced by Habermas (1979) (as cited in Kelly, 2004). The theory seeks democracy based on deliberation within society (Baiocchi, 2001). It is thought that deliberation can influence preferences of individuals and the process of deliberation allows for debates, learning from mistakes and ultimately fair decision-making as a result of democracy within a group (Baiocchi, 2001). The theory was influenced by Habermas (1979) by building on the idea of communicative rationality (as cited in Kelly, 2004). This term highlights the process of group communication arriving at a democratic consensus when making decisions (Kelly, 2004). When aiming to arrive at a consensus within a group, individuals deliberate on various considerations, including moral considerations (Kelly, 2004). Therefore, the deliberative democratic theory is appropriate to use in this research study as the process of deliberation of norms as well as individual preferences, and descriptive norms promoted by the normative information may have an effect on decisions made by participants.

Decisions to adopt climate relevant behaviour may be affected by the influence of the group communication on perceptions of the normative information because participants will be persuaded to consider their perceived moral obligations to adopt climate relevant behaviours. The deliberations of individuals may be influenced by the discussions and deliberations from

other members making up the group. For example, some participants may perceive climate relevant actions as unnecessary after deliberating on the normative information. The group communication of the normative information may influence the deliberation process because the personal norms deliberated on by participants differ among individuals. Therefore, the decisions to adopt climate relevant behaviour after deliberating on the normative information provided may be influenced by the deliberations of other members of the group.

Deciding to adopt climate relevant behaviour can be perceived as a consensual decision because participants discuss their perceptions and thoughts on the topic of climate change and climate relevant behaviour. Decisions made by participants may be influenced by the perceptions of other participants. As the deliberation of norms will affect the perceptions of moral behaviour for each participant, it can be suggested that the process of deliberation by each individual will influence the consensus to choose to adopt climate relevant behaviours because individuals' decisions can be influenced by the perceptions of other individuals. Therefore, the deliberative democratic theory will be applied to understand if group communication influences participants' deliberation of the normative information and thus the decisions to adopt climate relevant behaviour.

As well as previous literature studying the functional theory and the deliberative democratic theory, previous studies have also made use of focus groups as a communication method to investigate behaviour change. For example, Stoll-Kleeman, O'Riordan and Jaeger (2001) used focus groups to investigate the perceived personal responsibilities to tackle climate change. Participants of the study were informed on a topic and discussion followed in a focus group setting (Stoll-Kleeman et al., 2001). The focus group method successfully captured opinion formation among individuals when new information was communicated (Stoll-Kleeman et al., 2001). The study found various perceptions of climate change responsibility using this research method. However, Becken (2007) does point out that the discussion influenced using focus groups is a hypothetical situation and does not necessarily represent reality, thus behaviours engaged with in reality can only be estimated by discussion statements.

Therefore, the discussion statements collected using focus groups in this study will estimate the effect of group communication on the perceptions of impact and normative information and the resulting encouragement to adopt climate relevant behaviour. The hypothetical

situations of the group discussions will be examined, applying the functional theory and the deliberative democratic theory to understand the influence of group communication. The functional theory will help to examine if communication within a group setting influences the understanding of the impact information. In addition, the deliberative democratic theory will examine if the process of group communication influences the deliberation of the normative information and descriptive norms among participants. The use of the theories to examine communication within a group will add to existing studies that make use of focus groups to encourage behaviour change in order to increase awareness of the influence of communication of potential policy instruments. The functional theory and the deliberative democratic theory will correspond with the norm activation theory and the overarching institutional theory to create a theoretical framework for this research.

4 Methods

4.1 Introducing the Research Strategy

This research used focus groups to investigate the use of information to encourage climate relevant behaviour alongside examining focal barriers and the influence of communication within a group. During the focus groups, impact and normative information were presented and a commitment strategy gave participants the opportunity to decide to commit to climate relevant behaviours. The process of facilitating a change of behaviour among individuals using impact and normative information disclosure during focus groups acted as the first part of the research strategy and was followed by the second part of the strategy; recording the findings of participant experiences and perceptions of the information and communication within groups. The process of recording the findings made use of follow-up focus groups and questionnaires to collect in-depth data.

Focus groups were the main data collection method because the research aimed to explore a diversity of public perceptions of information. Discussion is easily encouraged and created using focus groups enabling the researcher to explore "a diversity of views" (Andreouli & Nicholson, 2018, p. 1326). This increased the reliability of the research as perceptions were gathered from a diversity of individuals enabling accurate comparisons between individuals' perceptions, attempting to increase the reality of the focus group datasets. The group communication within the focus groups encouraged rich, back-and-forth discussion or debate among participants with little manipulation needed from the focus group moderator. This increases the validity of the research findings because a natural discussion was established between individuals. Discussion was not forced by a strict question and answer structure between the moderator and participants but instead reflected realistic, honest perceptions shared by participants. The focus group method is often used in research studies based on public opinion and mass communication because of this ability to establish rich discussion to collect a diversity of perceptions (Stoll-Kleeman et al., 2001). Communication within a group has been analysed to understand the influence of communication as a tool to motivate behaviour change.

Moreover, further, valid perceptions were collected via questionnaires distributed to participants during the follow-up focus groups. Any thoughts not voiced during the focus

groups, perhaps because participants did not feel comfortable to voice them in the group setting, could be included in the questionnaires, increasing the truthfulness of results. In addition, questionnaires were chosen as a secondary research method because the interviewer effect was reduced because participants were answering anonymously rather than answering the questions directly to the moderator's face (Bryman, 2012). The questionnaires were not used to achieve statistical analysis but instead focus groups and questionnaires were used in conjunction to achieve a valid view of reality from the triangulation of results (Berg & Lune, 2012). It should be noted that the researcher acted as the moderator for all of the focus groups conducted.

The methods of focus groups and questionnaires have both been used in previous studies conducted around public opinions, behaviour changes and climate mitigation. Specifically, Lorenzoni et al., (2007) used focus groups and questionnaires alongside other methodologies to explore public perceptions of barriers to engaging with climate change, indicating a credible choice of method combination. This increases the reliability of the results because focus groups and questionnaires have been used in other studies indicating that several datasets have replicated this research method process.

It should be noted that prior to the data collection, the research process was assessed for ethical considerations by the Norwegian Centre for Research Data (NSD) and was approved as ethically sound. The research process was ethical because participants were informed that they could withdraw at any time, would remain anonymous, and any personal data, documents, and voice recordings would be responsibly destroyed after the completion of the project. In addition, all participants gave informed consent to take part.

4.2 Sampling Approach

A convenience sample with a quota approach was used to collect a sample of participants. A convenience sample gathers participants that are easily available and thus accessible to the researcher (Bryman, 2012). This sample was chosen as it was likely to achieve a high response rate and in order to gather a diversity of perceptions on the topic under discussion, this sample method was used to make participant recruitment easier to ensure enough participants would be gathered (Bryman, 2012). A convenience sample often limits a study because the data gathered cannot be generalised (Bryman, 2012). As qualitative studies are

generally difficult to generalise, the convenience sample may increase this limitation. However, as this study aims to establish a range of perceptions rather than to generalise, it does not limit the objective of the study.

The convenience sample was gathered using letters posted to potential participants who were residents of the counties of Shropshire and Worcestershire, in the West Midlands of the UK. The potential participant sample was chosen based on access, consisting of individuals loosely known to the researcher living in the sample area. Again, the focus on access to establish potential participants was based on ease in order to ensure enough participants would be gathered. This process of selecting potential participants might reduce the validity of the results because the loose connection that participants had to the moderator may increase the interviewer effect. Participant answers may be less truthful as a result. To reduce this limitation, the moderator introduced all focus groups by stating that there were no right or wrong answers to this process and any thoughts participants had would be very helpful to the research. In addition, the moderator was a small presence in the focus groups to reduce the interviewer effect.

The letters sent to potential participants explained what the focus group process would entail, the topic of climate relevant behaviour, as well as the location and dates of the focus groups. The aim to investigate the use of information was not mentioned to participants in order to achieve non-biased discussions regarding the information. In addition, the letter highlighted that participants taking part in the focus groups would remain anonymous, could withdraw from the process at any time and informed consent would be asked for from all participants to ensure the research was ethically sound. 25 letters were sent out to potential participants and 16 participants replied and agreed to take part.

Coupled with the letters, posters were put up around Cleobury Mortimer, a town located on the border of Shropshire and Worcestershire where the focus groups took place. In addition, a social media advertisement was posted on the local public Facebook page. The poster and the social media advertisement laid out similar information to that included in the letters. The posters recruited two participants and the social media advertisements recruited one participant. All three methods of gathering the convenience sample highlighted that any further individuals willing and interested to take part in the focus groups would be welcome. Therefore, six participants were recruited via a snowball sample, which involved potential

participants being contacted through participants initially recruited via the researcher (Bryman, 2012).

The quota approach was used within the convenience sample in the attempt to gather a diversity of public perceptions. The quota approach produces "a sample that reflects a population in terms of the relative proportions of people in different categories" (Bryman, 2012, p. 186). In the attempt to achieve age and gender diversity, the researcher organised participants into each focus group. Education and career status were not recorded, however, this information was volunteered by participants during the discussions. Gathering a diverse sample increases the reliability of the research because the results represent an accurate section of the population.

In total, 25 participants made up the sample. The aim for the number of participants was higher than 25, which could suggest a limit to the reliability of the study. Collecting fewer participants decreased the diversity of perceptions, which reduces the accuracy of the discussions in terms of the reflection of reality. In addition, the sample was slightly skewed as the gender balance was not achieved within groups. Altogether, 16 females and 9 males took part in the study. Specifically, in groups 1 and 3 one male participant was present in both groups and the rest of the participants were female in these groups. The gender composition in group 2 was balanced with an equal number of male and female participants. There was a slight imbalance in group 4 with four males and two females. Again, this gender imbalance could limit the reliability of the study, as the accuracy of perceptions in terms of the reflection of reality is reduced. However, the opinions of different genders were still gathered during the data collection, so a diversity of perceptions has still been achieved, despite this imbalance. The age of participants was balanced between groups with younger and older participants being present in groups 1, 3, and 4. Group 2 did not contain participants from younger generations, which makes the perceptions from this group less reliable as an accurate view of reality is not achieved. Participants with educational backgrounds regarding the topic under discussion and those without these backgrounds seemed to be present in all groups.

4.3 The Focus Group Process

Pilot focus groups were completed with three participants, one before the January focus groups and one before the February focus groups with the same three participants. Pilot focus

groups were completed in order to observe any improvements that could be made to the structure of the focus groups. The pilot focus groups also provided the moderator with an idea of how long each part of the focus group would take, for example, how long the consent forms would take to complete.

The focus groups took place in a meeting room at the Pioneer Centre, Cleobury Mortimer. This location established a professional atmosphere for the participants but also a comfortable situation so that participants would realise the importance of the study, but feel comfortable to answer questions truthfully without intimidation in the attempt to increase research validity.

The focus group process involved four focus groups completed from Monday 7th January to Thursday 10th January 2019. Follow-up focus groups were then completed one month later from Monday 4th February to Thursday 7th February 2019 with the same participant groups, however five participants were unable to attend. The repetition of focus groups increases the reliability of findings as the accuracy of results from each group can be compared to the other groups. All focus groups were completed in two hours from 18.00 to 20.00. The focus groups were planned and structured ensuring the groups ran smoothly and gathered the information required for the study. However, unstructured, probing questions were also used if a participant mentioned something which was deemed necessary to delve further in-depth into. A condensed structure consisting of the major elements of the January and February focus groups can be viewed in Appendix A, Figure 1 and Figure 2. All focus groups were recorded with a dictaphone, with permission from the participants to ensure the process was ethical, and transcribed for in-depth analysis. In addition, the moderator took notes during the focus groups and both the field notes and the transcriptions were written in researcher-personal codes and memos to ensure ethical data protection.

The four focus groups in January all had similar structures, however groups 1 and 2 included impact information provision in comparison to groups 3 and 4 which included the provision of both impact and normative information (Table 1). This structure was created to enable a comparison between the perceptions and experiences faced by participants who were exposed to different information types.

Table 1: Distinction between the focus groups

Focus Group Number	Dates	Information Provision	Number of Participants
Group 1	Monday 7th January Monday 4th February	Impact information	January = 8 February = 7
Group 2	Tuesday 8th January Tuesday 5th February	Impact information	January = 5 February = 4
Group 3	Wednesday 9th January Wednesday 6th February	Impact information Normative information	January = 6 February = 4
Group 4	Thursday 10th January Thursday 7th February	Impact information Normative information	January = 6 February = 5

As illustrated in Appendix A, Figure 1, all four focus groups in January began with a short introduction from the moderator. In addition, the participants read and signed a consent form. A solo task was then set, asking participants to write down or draw what comes to mind when hearing the term ‘climate change’. This task was set to ensure the participants were thinking about the topic under discussion and was a method of easing the participants into the discussion situation. This gave them the time to feel comfortable to ensure perceptions shared by participants were valid.

Discussion was focused on 10 climate relevant behaviours chosen by the researcher based on universal, daily household behaviours (Table 2). They were written up on a white board located in the meeting room so the behaviours would be present throughout the focus groups and participants could refer to them with ease.

Table 2: The climate relevant behaviours focused on in the focus groups including the domestic category they fall into and examples of the behaviours

Domestic Category	Behaviour	Examples
Electricity	Space heating	Maintaining separate temperature zones or turning down the thermostat
	Lighting	Energy saving lightbulbs or turning off lights in unoccupied rooms
Hot water use	Showering	Taking a three minute shower instead of a bath
	Washing machine temperature	Washing clothes at 30^0C rather than 40^0C
Food	Meat consumption	Reducing red meat consumption
	Shopping habits	Shopping at local sellers and buying local produce
Recycling/Waste	Food waste	Buying less food in order to waste less
	Composting	Composting organic waste
Transport	Personal vehicle use	Walking, cycling, or car sharing
	Public transport	Using public transport for shorter journeys

Questions asked during the focus groups related to how these domestic behaviours fitted into participants' daily lives. Participants deliberated on whether they had considered changing any of their behaviours to act more climate consciously and what would motivate them to adopt climate relevant behaviours. Moreover, participants discussed where climate change information is accessed from and how they feel about the way it is conveyed. In addition, during the January focus groups, discussion was directed towards the impact and/or normative information that was provided during the groups and what participants thought of that information.

The impact information provided during each focus group completed in January was collected and provided to participants by the moderator. This collection method could have reduced the reliability of results because emission statistics were chosen based on interesting figures that the moderator felt would achieve the required discussion during the focus groups. This may reduce the accuracy of results obtained from the discussions because the information was chosen with the agenda to manipulate and achieve discussion. This could have exaggerated the hypothetical situation of the focus groups rather than representing

reality. However, this limitation did not seem to affect results because the impact information enabled deliberation by participants and encouraged them to consider changing their behaviours to some extent. In addition, providing the impact information via the moderator may also limit the validity of results. Participants may have felt obligated to voice positive opinions about the impact information as it was provided by the moderator who was present in the room. However, this limit to validity was reduced by using questionnaires to gather truthful perceptions from participants.

Indicated in Appendix B, Table 1, each participant received a hand-out containing impact information for each of the 10 behaviours laid out in Table 2. The moderator read out the impact information during the focus groups whilst the participants followed. The impact information was collected from published literature. For example, research published by Professor Angela Druckman was used for a proportion of the impact information. Personal communication was established between the researcher and Prof. Druckman, who has an extensive overview of the research completed in this field of study in the UK. The impact information was kept consistent for each behaviour by using statistics that indicated yearly emissions data. The moderator ensured that the impact information was provided in the same way in all four groups in order to establish an accurate and reliable comparison of discussions and experiences.

The normative information presented in groups 3 and 4 during the January focus groups was provided by David Howard, Chairman of Stretton Climate Care. Once again, the validity of discussion findings may be reduced as David Howard was in the room listening to the perceptions. This could have influenced participants to provide positive opinions on the information. However, David Howard was not present in the February focus groups meaning participants could feel open to speak honestly, thus increasing the validity of the results. Stretton Climate Care is a charity located in Church Stretton, Shropshire, helping the local community to increase energy efficiency and reduce carbon emissions (Stretton Climate Care, 2019). David Howard provided the normative information based on examples of how the community of Church Stretton, his colleagues at Stretton Climate Care and himself and his family have adopted climate relevant behaviour. The normative information focused on communicating descriptive norms to create a type of role model situation to establish if viewing what other people do in a neighbouring town influences the motivation of participants to adopt climate relevant behaviour (Kollmus & Agyeman, 2002). Goldstein,

Cialdini, and Griskevicius (2008) highlighted that communicators of descriptive norms should ensure that these norms draw comparisons to the situation of the target audience. This enables the audience to relate these descriptive norms to their circumstances. The descriptive norms communicated by David Howard (normative information provider) focused on lifestyles in a neighbouring town to the participants, making the situational circumstances similar. The normative information provided in groups 3 and 4 was presented in the same way in both groups to ensure accurate comparison of discussions and experiences.

Towards the end of the January focus groups, participants had the opportunity to make a one-month commitment to adopt one or more climate relevant behaviours. These behaviours could be chosen from those discussed during the focus group or chosen from the participants' own ideas. Commitment strategies have been defined in a study by Lehman and Geller as "asking participants to make a verbal or written commitment to perform a desired behavior" (2004, p. 20). The commitment strategy used during the focus groups came in two parts illustrated in Appendix A, Figure 1. Participants were asked to think about and write down what behaviours they could commit to. After that, further discussion occurred regarding what the participants felt they could commit to and any barriers they perceived. The provision of normative information also occurred in the cases of groups 3 and 4. This gave the participants the opportunity to deliberate on their behaviour commitments. The second part of the commitment strategy was facilitated after this further discussion or information provision, involving the process of asking participants to refine their final climate relevant behaviour commitments. Commitment strategies have been found as effective strategies to influence pro-environmental behaviour, indicating an appropriate tool to explore the experiences and perceptions of the focus group process and the information provision (Lehman & Geller, 2004).

To explore the participants' experiences and perceptions, participants returned one month later to attend follow-up focus groups in February, the structure of which is illustrated in Appendix A, Figure 2. The groups began with an anonymous questionnaire. Four versions of the questionnaire were created; one for participants who attempted the climate relevant behaviours committed to and were presented with impact information during the January focus group, one for participants who did not attempt the climate relevant behaviours committed to and were presented with impact information, one for participants who attempted the climate relevant behaviours committed to and were presented with both impact

and normative information during the January focus group, and one for participants who did not attempt the climate relevant behaviours committed to and were presented with both impact and normative information. However, all four versions were nearly identical, only few questions were different. The questionnaire completed by participants in groups 3 and 4 can be seen in Appendix C, Table 2. It could be suggested that the choice to create different versions of the questionnaire and distribute them not so subtly limited the validity of the findings as participants may have felt embarrassed in the group setting to admit they did not attempt the behaviours. However, answers given by participants were extensive and in-depth suggesting valid reflections on their commitments. In addition, all questionnaires asked for the length of time that participants were able to commit to their behaviours for, enabling the opportunity to be honest without judgement. As seen in Table 1, five participants did not attend the follow-up focus groups, therefore, the questionnaire was posted to them to collect their feedback.

The questionnaires included questions relating to the experience of the climate relevant behaviour commitments, the focus group process, and perceptions of the impact and/or normative information. In addition, questions relating to social barriers, technical barriers and economic barriers were included. These barrier categories relate to any likely challenges faced by the participants when adopting climate relevant behaviour in their daily lives. There was a slight overlap between the questionnaire and the questions during the follow-up focus groups, however the questionnaire allowed the participants to get more in-depth with their answers and could answer without the pressure of communicating within a group. This also allowed the researcher to identify any distinct differences in shared perceptions and experiences between the questionnaire and the oral discussions during the focus groups. This increased the validity of results because the truthfulness of participant answers within the discussions could be perceived. In addition, the questionnaire was completed at the beginning of the February focus groups to instigate extensive thinking about experiences and to make sure answers were not influenced by the discussions of other individuals.

During the February focus groups, the discussion was directed towards the participants' experiences with the behaviour commitments, the barriers faced during the process, and perceptions of the different types of information that were presented during the January focus groups. The February focus groups followed the idea of a feedback strategy as studied by Lehman and Geller (2004). The use of the second round of focus groups enabled the

moderator to ask probing questions to gain feedback. This was in the attempt to discover if the impact and normative information were encouraging or de-motivating (Lehman & Geller, 2004).

4.4 Data Analysis

The main analysis techniques of thematic analysis and conversation analysis were utilized in this research. Furthermore, tape-based analysis was the technique used during the transcribing process following the focus groups. This involved listening to the audio recordings and creating a condensed transcription of the discussions (Beyea & Nicoll, 2000). This version of analysis was chosen rather than transcript-based analysis, which involves transcribing the entire audio recording, because tape-based analysis is far less time-consuming leaving further time for thematic analysis of the significant information gathered from the focus groups (Beyea & Nicoll, 2000).

The raw data was organised into different themes using thematic analysis. Thematic codes categorised single quotes and larger conversation extracts into themes. In addition to thematic analysis, conversation analysis was used to observe conversational aspects such as gestures including head nodding, any reluctance or motivation to speak, or when participants would speak over one another in the transcripts. This increased the validity of results because any influences on the truthfulness of answers could be identified. Conversation analysis allowed the interaction between participants to be observed and considered and to investigate if interacting with other individuals in a group setting influenced the participants' decisions to adopt climate relevant behaviour (Bryman, 2012). These analysis methods alongside the qualitative data collection were used in collaboration to achieve triangulation (Berg & Lune, 2012). The triangulation increases the validity of this research as the research questions can be analysed from various participant perspectives from group discussions and personal questionnaires in order to identify the consistency of participant perceptions.

5 Results and Analysis

The data collected from the focus groups and the questionnaires highlight various barriers to adopting climate relevant behaviour and the influence of communication within a group. In addition, various participant perceptions relating to climate relevant behaviour, impact information, normative information, and general information received from elsewhere, outside of the focus groups, will be analysed.

The analysis of individuals' perceptions of barriers, the information formats, and group communication were compared between the four different focus groups as well as between discussions in the January and February focus groups. The study was able to control the provision of impact information and normative information in the different groups meaning the effect of the information formats can be compared. In contrast, the group dynamics could not be controlled. Group dynamics refer to differences in gender, age, and personalities among participants in each group. Therefore, group dynamics have been analysed to examine if they had an influence on the decisions to adopt climate relevant behaviours.

5.1 Action

All 25 participants taking part in the focus group process committed to one or more climate relevant behaviours for a length of time. All of the participant commitments and the duration of the commitments can be seen in Table 3.

Table 3: The climate relevant behaviour commitments chosen by each participant and the duration of the commitments

Group	Participant Number	Climate Relevant Behaviour Commitment(s)	Commitment Duration
1	1	Buy less food to try to reduce food waste. Take shorter showers.	4 weeks
	2	Turn off lights in unoccupied rooms.	4 weeks
	3	Turn off lights, TV, and plug sockets. Turn the heating down. Reduce red meat consumption.	4 weeks
	4	To be more aware of food waste. To walk more to the local shop for a few items that are not too heavy to carry. Re-use more shopping bags rather than buy plastic bags.	4 weeks
	5	To order main shop online. Switch off the tap when cleaning teeth. Switch off unnecessary lights around the house. Turn off radiators in unused rooms. Use reusable kitchen towel.	4 weeks
	6	Turn radiator off in spare rooms. Reduce washing machine to 30°C more often.	4 weeks
	7	Buy a pot and put some soil in it in order to try to grow a vegetable plant and eat it afterwards. Reduce meat consumption.	<1 week 4 weeks
	8	Take shorter showers. Buy and waste less food. Wash clothes on a lower temperature.	1-2 weeks 4 weeks
2	9	Reduce food waste. Reduce hot water use.	4 weeks
	10	To be more vigilant and to monitor current water usage in order to reduce litres wasted. To be more aware of recycling waste and sort it correctly.	2-3 weeks
	11	Investigate washing clothes at 30°C. Switch more lights off around the house. Only boil the correct amount of water when using the kettle.	4 weeks
	12	Reduce/stop heating low use rooms. Keep thermostat no higher than 17°C.	4 weeks
	13	More wash cycles at 30°C rather than 40°C.	<1 week

Table 3: The climate relevant behaviour commitments chosen by each participant and the duration of the commitments (continued.)

Group	Participant Number	Climate Relevant Behaviour Commitment(s)	Commitment Duration
3	14	Shorter showers. Take less baths. Reduce food waste.	4 weeks
	15	Take three minute showers. Buy less food in order to waste less. Compost organic waste. Stop heating greenhouse. Stop using heated clothes dryer. Walk to the leisure centre rather than drive.	4 weeks
	16	Shop locally. Compost more. Buy less food in order to waste less.	2-3 weeks 4 weeks
	17	Reduce food waste. Take more showers rather than baths. Create a compost bin. Turn lights off when not in use. Turn heaters off in unused rooms. Shop more at the local farm shop. More clothes washes at 30°C.	4 weeks
	18	Wash clothes at 30°C rather than 40°C. Get public transport more, for example, three times per week. Take shorter showers.	1-2 weeks 4 weeks
	19	Take three minute showers. Reduce meat consumption. Shop for local produce from local sellers. Arrange for solar panels to be fitted.	4 weeks
4	20	Reduce meat consumption by 25%. Purchase and use shampoo bar. Purchase re-fillable laundry liquid bottles and refills.	4 weeks
	21	Reduce meat consumption by 25%. Buy less food in order to waste less.	3-4 weeks
	22	Buy less food in order to waste less. Compost better.	4 weeks
	23	Buy less food in order to waste less. Be more aware of dates on food. Be more inventive with recipes in order to use the food already in the kitchen.	4 weeks
	24	Turn off lights and change the rest of the bulbs in the house to LED bulbs. Reduce red meat consumption to one meat free meal per week. Take three minute showers. Sign up for printer cartridge recycling scheme.	4 weeks
	25	Turn off lights including some standby lights. Use less water. Buy less food in order to waste less. Take shorter showers. Try to reduce car use.	4 weeks

Most of the participants chose their commitments from the 10 climate relevant behaviours introduced during the January focus group. These were presented in section 4.3, Table 2. Additionally, some participants chose different behaviours based on their own ideas. For example, Participant 11 chose to commit to only boiling the correct amount of water when boiling the kettle. Table 3 also indicates that the majority of behaviours were committed to for the full four-week period. Where two time lengths are provided for a participant, this indicates that participants committed to more than one behaviour and committed to them for different lengths of time. In addition, Table 3 highlights that the commitment choices and the duration of the commitments do not seem to differ greatly between each group. The barriers faced by participants during their commitments will be analysed.

5.2 Barriers

The data collected highlight various themes which indicate barriers to participating in climate relevant behaviour, enabling analysis relating to the research question; what are the focal barriers for individuals adopting climate relevant behaviour? Barrier themes were depicted from the data by analysing the focus group transcripts to identify which themes cropped up several times. Perceptions were depicted from discussions and then separated into the 10 themes that were the most prominent in discussions. Prominent themes were depicted from those mentioned several times by participants. The 10 barrier themes identified from the focus group discussions are shown in Table 4, Panel A and Panel B.

Table 4: Participant thoughts and perceptions sorted into focal barrier themes identified from the focus group discussions **(Panel A)**

Group	Themes (thoughts and perceptions from focus group discussions)				
	Free Rider Problem	Power	Economic	Social (Family)	Habit
Group 1	**Jan:** Developing countries do not tackle climate change. **Feb:** Governments and corporations should take responsibility. Individuals cannot change anything.	**Jan:** Something wrong at the top including governments and online delivery companies. **Feb:** Supermarkets have the power to reduce food waste by avoiding short sell-by dates.	**Jan:** Local produce is larger but more expensive. Turning off sockets at night for cost saving. **Feb:** Businesses have to pay for recycling bins. Cost expenditure is motivating.	**Jan:** Children leave lights on. Sports kits need 40°C washes. Family cause waste. **Feb:** Family forget to eat food which causes waste and they prefer red meat. Children did not turn lights off but took short showers.	**Jan:** Habit of leaving phone charging overnight. **Feb:** Forget behaviours due to the habit of leaving lights on and washing at 40°C.
Group 2	**Jan:** UK cannot make a difference when larger countries continue polluting as well as some societies of the UK not caring. **Feb:** Need global cooperation.	**Jan:** Corporations hold the power to change behaviours. Politicians are taking over the climate debate. **Feb:** Scientists hold the power to manipulate the climate change debate.	**Jan:** Saving money is a motivator. Behaviours are adopted to reduce bills. Some individuals cannot afford to adopt certain behaviours. **Feb:** Reducing CO_2 also reduces cost of living.	**Jan:** Family not interested. Family size motivates adoption of behaviours for cost saving. **Feb:** Children do not turn lights off. Objections to turning the heating down. Some family cooperated.	**Jan:** Climate relevant behaviours can become habitual such as using reusable bags and are already automatic for some. **Feb:** Turning lights off at work is a habit.
Group 3	**Jan:** Individuals think it is someone else's problem and many people do not care about climate change. **Feb:** Need collective action. Individuals need to feel that they are not tackling the issues alone.	**Jan:** Corporations and governments ignore climate change. UK citizens could be leaders in the change. **Feb:** Need help from the government to enforce change. The meat industry is powerful so difficult to take on.	**Jan:** Companies aim for profit. Local produce is expensive, but the environmental benefits may outweigh this. Cheap produce is hard to resist. **Feb:** Electric cars are unaffordable and elitist.	**Jan:** Anticipated that family members would not approve some behaviours. **Feb:** Family objected to compost bin in the kitchen and children ignore climate change. Grandchildren leave lights and TV on.	**Jan:** Not mentioned. **Feb:** Daily behaviours are very habitual, so actions happen without thinking. Adopting climate relevant behaviour must become a lifestyle change to develop new habits.
Group 4	**Jan:** Some places do not care making individual changes feel insignificant. Cannot see what changes just one person can make. **Feb:** Need everyone to commit to the simple changes.	**Jan:** The mass consumer, corporations and policies are powerful enough to make change. Media platforms have the power to promote biased information. **Feb:** Conglomerates need to take the lead.	**Jan:** Cost saving information over a time span would be helpful. **Feb:** Resisting food bargains in supermarkets is difficult and LED lights are expensive.	**Jan:** Children take long showers. Foresee objections from family to reducing thermostat. **Feb:** Some children attempted behaviours. Had to cook meat for elderly relative in the household.	**Jan:** Some policies encourage habit changes such as plastic bag charges. **Feb:** Being lazy is a difficult habit to change. Habits cause individuals to forget their new behaviours.

Table 4: Participant thoughts and perceptions sorted into focal barrier themes identified from the focus group discussions (continued.) **(Panel B)**

Group	Themes (thoughts and perceptions from focus group discussions)				
	Personal Circumstance	Home Comforts	Available Time	Education	More Pressing Issues
Group 1	**Jan:** People rely on cars due to poor public transport. Avoiding waste when cooking for one is difficult. Modern heating systems make space heating a lot easier. **Feb:** Must drive a car.	**Jan:** 14°C is too cold and heating removes house odour. Long showers and background noise are preferred. Produce only sold in the 'correct' shape. **Feb:** Participants prefer baths and did not heat rooms at 14°C.	**Jan:** Not mentioned. **Feb:** Not enough time to give to climate relevant behaviours. No time to plan meals. Participants would rather spend time with family than walk to shops.	**Jan:** Not mentioned. **Feb:** Schools do not promote climate relevant behaviours. Children take food waste home. Schools do not take action to mitigate climate change.	**Jan:** All meats seem to cause issues, not just red meat. Statistics needed on the effects of chicken as it is widely consumed in the UK. **Feb:** Not mentioned.
Group 2	**Jan:** Commuters need cars, as public transport is poor. Red meat reduced for health reasons. **Feb:** Electric cars can be difficult if charging points are not built close by. Modern houses have better insulation and heating systems.	**Jan:** Recycling plants are not wanted near houses. 14°C is too cold. Giving up red meat is not an option. LED bulbs are not preferred. **Feb:** Certain red lines will not be crossed such as becoming vegetarian.	**Jan:** Prefer showers rather than baths as they take less time. **Feb:** Only filling the kettle with the necessary water reduces boiling time.	**Jan:** Curriculum includes imbalanced information on climate change. School are teaching children to be climate conscious. **Feb:** Climate change is taught in schools. Younger generations made to feel helpless in climate change mitigation.	**Jan:** Concern with single use plastic waste is larger than other climate relevant behaviours. Wars are the most pressing global issue. **Feb:** Volatile persons, the threat of nuclear war and Brexit are more pressing issues.
Group 3	**Jan:** Public transport is difficult. Composting requires a garden. Houses without a shower mean individuals can only take baths. New washing machine models have simpler lower °C options **Feb:** Indoor composting is difficult with pets.	**Jan:** Washing tea towels at 30°C and heating at 14°C would not be considered. Aesthetically 'correct' produce is expected. **Feb:** Customers want produce to be in season all year round. Red meat wasn't missed during commitment to reduce red meat.	**Jan:** Time needed to plan meals to reduce food waste. **Feb:** Time needed to organise which public transport routes to take as transport connections are poor. Time needed to plan meals in order to buy less food.	**Jan:** Education should focus on positive change. Children aren't environmentally aware because schools are exam factories. Movies include climate messages. **Feb:** More climate change focus needed in schools. Need to encourage students to learn more about it.	**Jan:** White meat should also be tackled because of the mass consumption of chicken and chicken wings in the UK. Fresh food cannot be donated to food banks which creates food waste which could go to those in need. **Feb:** Not mentioned.
Group 4	**Jan:** Cars needed much more in rural areas than cities. It is difficult to avoid waste when cooking for one. Local shops are closer to some people than others meaning walking is more difficult for some people. **Feb:** Personal circumstance is a barrier.	**Jan:** Seasonal produce is demanded all year round. Participants mentioned that some individuals enjoy hot summers, so claim they do not mind global warming. Owning a freezer may contribute to waste. **Feb:** Not mentioned.	**Jan:** Giving time to preparing food from scratch is difficult. Park and Ride schemes reduce time used on traffic and parking. **Feb:** Time to plan meals from frozen items to avoid food waste is not always available.	**Jan:** Some participants had not studied climate change on academic platforms, but information was available in the media. **Feb:** No matter how much education individuals receive; they may still not care.	**Jan:** Red tape deems that donating fresh food to shelters cannot occur meaning food is wasted. News platforms should provide an overview of all important news topics. **Feb:** Money going into tackling climate issues could be going to the homeless.

The themes represented in Table 4 are condensed explanations of participants' perceptions arising from the two-hour focus group discussions. Table 4, Panel A and Panel B both highlight 5 significant themes arising from discussions. It should be noted that the condensed explanations are not representative of all participants' opinions on each theme within the group; however, the condensed explanations do highlight the most common points discussed by several participants within the group or interesting discussion points that were provided by one or more participants. In addition, quotes and extracts from the focus group discussions will be presented to help analyse the data relating to perceived barriers. Again, the quotes used are not representative of all participants' thoughts, however, they do represent the themes arising in the discussions from one or more of the participants. Discussions of barriers were manipulated into the focus groups and questionnaire using specific and probing questions.

Participant perceptions presented in Table 4 are also organised into the discussion points from the January focus group (Jan) and the February focus group (Feb) after the behaviour commitments had been attempted. This organisation can indicate if there was an influence from the information or from the group dynamics. For example, participants from groups 3 and 4 may have felt more open to speak in the February focus group when the normative information provider was not present. Each barrier presented in Table 4, Panel A will be analysed, followed by the combined analysis of the further barriers highlighted in Table 4, Panel B. In addition, questionnaire answers relating to social, economic, and technical barriers, as well as the most significant barriers faced are shown in Appendix D, Table 3. All participants experienced barriers apart from Participant 6, suggesting that commitment choice affected the experience of barriers. The commitments formed by Participant 6 did not seem to significantly influence household lifestyle patterns which may have influenced the absence of experienced barriers. However, other participants committed to the same behaviours and did experience barriers.

5.2.1 Free Rider Problem Barrier

The barrier of the free rider problem was identified in the focus group discussions. Similarly, Quimby and Angelique (2011), identified the free rider problem as a challenge to changing behaviours. The characteristics of the free rider problem that seemed to challenge participants in this study were; the gross free rider which depicts individuals receiving gains without

contributing, and the active free rider which depicts individuals receiving gains without contributing even though the individual is capable of contributing, (Lewis, 2006). Participants perceived individual action as not making a difference and so contributing to the efforts of reducing greenhouse gas emissions should not come from them but from collective populations, governments and powerful corporations. Individuals perceived greenhouse gas emissions mitigation (the gains) as necessary but felt contribution should come from elsewhere.

The gross and active free rider problem arose from discussions as participants discussed the need for everyone to cooperate in order to reduce emissions. For example, Participant 24 in group 4 stated, *"if you can get enough people just doing the simple things [the climate relevant behaviours discussed during the focus groups] and everybody's doing the simple things [change will happen]"*. This suggests that participants will not contribute without everyone else contributing to the adoption of climate relevant behaviours. Participants thought the responsibility for adopting climate relevant behaviours fell on governments and powerful corporations. For example, Participant 4 in group 1 stated, *"okay every little bit makes a difference but that's where I was belligerent because they [large corporations and governments] need to be forced, when they're contaminating this planet so badly they need to be more accountable and forced to be accountable".* Participants felt that individual citizens cannot make a difference with changing their behaviours, thus the responsibility to reduce greenhouse gas emissions falls on larger, more powerful countries and industries. These thoughts relating to the free rider problem as a barrier cropped up in discussions from each group and there did not seem to be changes in perceptions of this barrier between the January and February focus groups.

5.2.2 Power Barrier

The power barrier highlights that participants perceive power as a key characteristic for reducing greenhouse gas emissions. Discussions highlighted that power is needed to make change, therefore, powerful governments, corporations and industries need to use their power to reduce greenhouse gas emissions (Table 4, Panel A). For example, Participant 1 in group 1 stated, *"there is something wrong at the top [governments] rather than with us at the bottom"*. The discussions suggest a link to the passive free rider (Quimby & Angelique, 2011). Participants feel they are incapable of enforcing change with adopting individual climate relevant behaviours because individuals do not have the power to do so. Therefore,

the free rider barrier and the power barrier link together to make individuals feel they cannot contribute enough to significantly reduce the emissions, and are therefore demotivated to adopt climate relevant behaviours.

The power barrier is discussed somewhat differently in groups 1 and 2 compared to groups 3 and 4. Groups 1 and 2 discuss 'others' as holding the power to create change, referring to governments, corporations and powerful countries. These discussions are similar in the January and February groups. In contrast, the power of the individual to reduce emissions is referred to in both groups 3 and 4 in the January focus groups. For example, Participant 18 in group 3 stated, *"we're [UK population] definitely leaders in the change [the change to a more climate conscious lifestyle]"*. In addition, Participant 21 in group 4 stated, *"Well in the end, it's the purchaser that holds the power (…) if you have a mass consumer power, if people suddenly stopped buying something, (…) there is power in the consumer"*. In contrast, in the February groups, discussions around power referred more to how 'others' hold the power to reduce emissions. This indicates that the behaviour commitments could have influenced participants to feel that they do not have the power to make much difference with their behaviour changes. Also, the contrasts between discussions in groups 1 and 2 and groups 3 and 4 could suggest that the normative information has a discouraging effect on individuals feeling they have the power to make a difference.

5.2.3 Economic Barrier

Economic aspects as a barrier to climate relevant behaviour were also discussed in the focus groups. This barrier refers to the preference to spend less on household consumption. Kollmus and Agyeman (2002) found that economic factors act as either incentives or barriers to adopting behaviour. The effect of financial aspects on participants' ability and motivation to adopt climate relevant behaviour was perceived as an incentive more than a barrier (Table 4, Panel A). For example, Participant 20 in group 4 stated, *"you can divide up the things [the climate relevant behaviours] that you can do that cost nothing or in fact will save you money, to things like shopping more locally, that inevitably cost more"*. Discussions from all groups indicate cost saving as a motivator rather than a barrier for adopting climate relevant behaviour. For instance, the savings to cost of living resulting from reducing hot water use and turning lights off were more of an incentive to adopt behaviours than the incentive of environmental benefits. For example, Participant 11 in group 2 stated, *"if it [a behaviour*

change] involved saving money and reducing bills (…) I'm happy to look into doing anything". This indicates that participants perceive economic factors as an incentive.
A further point to note is the effect of the group dynamics on perceptions of this barrier. It seems that some effect of attitude polarisation occurred within the groups. For example, in group 2, one participant had a confident personality and was extremely outspoken regarding strong personal views and preferences. One belief that was voiced by the participant was the incentive of savings to cost of living being the sole reason for adopting climate relevant behaviours. This seemed to effect attitudes within the group as discussion seemed to revolve around this belief and influence agreement with this perception from other participants. In addition, the age dynamic of group 2 was imbalanced as there were no participants present from younger generations. This could influence perceptions of this barrier because participants did not have the chance to hear and be influenced by the views of younger generations. Thus, group dynamics must be taken into account when analysing the perceived economic incentive for adopting climate relevant behaviour.

On the other hand, economic aspects as barriers were mentioned in discussion, more so in groups 3 and 4. For example, Participant 19 in group 3 stated, *"one thing that would make a huge difference is if people could drive electric cars, but how many people can afford a car of £31,000, so it's [climate relevant behaviour of driving an electric car] prohibited really"*. Furthermore, Participant 16 in group 3 stated, *"if it was cheaper to shop locally and use local projects, then you would obviously, but it's not viable for the local producers to [reduce their prices]"*. In addition, Participant 24 in group 4 discussed the expensive price of LED bulbs. This indicates a difference between perceptions in groups 1 and 2 and groups 3 and 4 suggesting a possible effect of the normative information. Participants in groups 3 and 4 seemed to discuss financial aspects as barriers more than participants in groups 1 and 2, potentially as a result of the normative information influencing perceptions of climate relevant behaviours creating an expensive lifestyle.

In the same way, economic barriers specified in questionnaire answers highlight that the few participants that did experience economic barriers were in groups 3 and 4, indicated in Appendix D, Table 3, again suggesting possible influence from the normative information. Despite these economic barriers perceived by some participants, a count of 20 out of the total 25 participants did not specify any economic barriers in the questionnaire, suggesting that this type of barrier was not a challenge for most participants. Furthermore, another influential

aspect to note is the choice of behaviour commitment by each participant. For example, a participant that committed to changing their lightbulbs to LED bulbs is likely to have an economic barrier to overcome compared to a participant that committed to reduce their hot water usage. Therefore, it cannot be stated with certainty that the normative information had an influence on perception of economic barriers among individuals because the choice of commitment no doubt influences the perceptions of economic aspects as an incentive or a barrier to behaviour change.

5.2.4 Social (Family) Barrier

The social barrier theme refers to the barriers faced as a result of family members of the participants, usually those family members living in the same household of the participant. This distinction is made to indicate that only family barriers are mentioned, not other social barriers such as those associated with the participants' friends. Kollmuss and Agyeman (2002) also highlight that intentions to change behaviours are affected by social pressures. Social barriers seemed to be the most significant focal barrier identified as the barrier had the most influence of participants' ability to commit to climate relevant behaviour.

Discussions from all groups highlight social barriers as a difficult challenge to overcome. Table 4, Panel A indicates that discussion in all four focus groups developed around the pressures felt from other household members, especially children, which create difficulty to continue the climate relevant behaviour commitments throughout the household. For example, all groups discussed disinterest from the majority of family members regarding adopting climate relevant behaviours in the household. This was shown by Participant 3 in group 1 who stated, *"children were an issue because they just can't turn lights off"*. In addition, Participant 19 in group 3 stated, *"when we're looking after the grandchildren in the morning, every light in the house is on, the television's on".* Furthermore, as well as disinterest among family members, discussion in all four groups indicated that the daily lifestyle of family members in the household make climate relevant behaviours difficult to continue. For example, participant 20 in group 4 stated, *"we have an elderly relative living with us who has the same, pretty rigid diet in lots of ways and (…) expects meat all the time (…) not that it has to affect us but it inevitably does because you don't have the time to do all the different things [different meals]"*. In addition, Participant 5 and Participant 3 discussed

family member lifestyles that make it difficult to continue certain climate relevant behaviours;

Participant 5: *"If you've got children, like she's [Participant 3] got three kids and they're [playing sport]"*

Participant 3: *"[Their sports kits are] always full of mud"*

Participant 5: *"You've got to sometimes go up to 40°C [on the washing machine], at least 40°C or you can't get the dirt out [of their clothes]".*

As well as the social barriers being evident in all groups, this barrier was perceived in the January focus groups and confirmed in the February focus groups.

Leading on, questionnaire answers similarly indicate social barriers as significant. Highlighted in Appendix D, Table 3, six out of the total 25 participants chose family pressures as their most significant barrier when attempting to commit to climate relevant behaviours. For example, Participant 9 in group 2 committed to reducing food waste and hot water use and stated that the most significant barrier faced was the pressures from family. Furthermore, 14 participants specified experiencing a social barrier relating to family pressures. These barriers include; commitment to driving grandchildren to sport activities, children having a flippant attitude towards electricity and water use, and objections from family members regarding the behaviour commitments. These social pressures were felt from participants from all four of the groups.

5.2.5 Habit Barrier

Habitual behaviour is also indicated in Table 4, Panel A as a barrier to behaviour change. Kurz, Gardner, Verplanken, and Abraham (2015) studied habitual behaviour in relation to climate relevant actions. The study highlighted habit as a construct that "generates impulses to repeat familiar behaviors in particular settings" (Kurz et al., 2015, p. 114). The study leads on to highlight that many household behaviours such as those discussed in this research, for example, hot water use, are repetitive and thus habitual in nature.

Discussions in groups 1, 3 and 4 indicate habit as a barrier to newly adopted climate relevant behaviours. For example, Participant 2 in group 1 stated, *"I put memory [as the most significant barrier faced] because I created a habit of not turning off [lights] so I think I need to get into the habit of turning off [lights]"*. As Kurz et al., (2015) suggested, this indicates that environmentally damaging behaviours are often performed out of habit. In contrast,

discussions from group 2 highlighted an interesting view that climate relevant behaviours are often habits in themselves. For example, Participant 12 in group 2 stated, *"it's [certain climate relevant behaviours] just automatic as far as I'm concerned"*, indicating that habitual behaviour can also refer to climate relevant behaviours becoming a daily habit. Group dynamics could also have had an influence on the perceptions of this barrier. This is because participants that found climate relevant behaviours difficult to adopt because of existing habitual behaviour may have been influenced by the thought of being judged by the participants who were adopting these behaviours continuously out of habit. Therefore, habit as a barrier may not have arisen in group 2 discussions because of this dynamic. In addition, it is indicated in Table 4, Panel A that habit was not discussed by group 3 in the January focus group but was mentioned in the February focus group as a barrier to action. This suggests that habit was not a perceived barrier to behaviour change but was faced during the commitments.

5.2.6 Summary on Panel A Barriers

In summary, the data indicated in Table 4, Panel A highlight 5 themes that are discussed in relation to focal barriers for individuals adopting climate relevant behaviour. The most significant barrier seemed to be the social barrier as participants from all groups discussed the effect of family lifestyles and preferences as difficult to overcome when adopting climate relevant behaviours in the household. The barriers seemed to be similarly discussed in all groups. However, the differing perceptions of the power barrier between groups 1 and 2 and groups 3 and 4 could suggest a possible negative influence of the normative information. Perceptions in groups 3 and 4 changed from individuals having the power to enforce change during the January focus group, to governments and corporations needing to use their power to create change during the February focus group. This suggests that the normative information could have changed perceptions to think climate relevant behaviour adopted by individuals cannot make a powerful enough difference. In addition, normative information was suggested to have an influence when discussing the economic barrier. Economic aspects were mainly seen as incentives to adopt climate relevant behaviour, but discussions from groups 3 and 4 focused on economic aspects as barriers to adopting behaviours. This could suggest the normative information highlighted climate relevant behaviour as an expensive lifestyle change.

Group dynamics also seemed to influence perceived barriers. In particular, the confident personalities present in group 2 as well as the lack of participants from younger generations seemed to cause some attitude polarisation. One participant in group 2 was very outspoken about some strong views for example, the incentive of committing to climate relevant behaviour solely for cost savings rather than climate benefits. This seemed to lead the discussion to revolve around these views rather than other participants voicing different views. In addition, the views of younger generations were not heard by the participants in group 2 meaning perceptions could not be influenced by views from individuals of a different age group. However, participant commitments did not seem to differ between groups indicating that the focal barriers discussed and the group dynamics mentioned did not stop participants from attempting all relevant behaviours.

5.2.7 Further Barriers (Panel B)

Further barrier themes that were discovered from the focus groups discussions and questionnaire answers were personal circumstance, home comforts, available time, and issues that were perceived more pressing than adopting climate relevant behaviours to reduce greenhouse gas emissions. The condensed explanations of participants' perceptions relating to these barrier themes are shown in Table 4, Panel B.

Personal circumstance in this study relates to the place of residence of the participants and the style of their households, for example, the number of people living in the household or when their house was built. This theme seems to significantly relate to the rural location that the study was conducted in. Personal circumstance seems to be a physical constraint to adopting climate relevant behaviour. The barrier theme was discussed in all groups and was mentioned as a perceived constraint in the January focus groups and confirmed as a constraint in the February focus groups. The biggest challenge relating to this physical constraint discussed in all groups is the dependence on personal vehicle use as a result of living in a rural area. For example, Participant 2, Participant 3, Participant 5, and Participant 8 from group 1 discussed the public transport services in the local area;

Participant 5: *"The transport isn't very good round here"*

Participant 3: *"It's dreadful"*

Participant 2: *"The bus doesn't go on Sundays"*

Participant 8: *"The bus doesn't run at all on Sundays (…) and on weekdays it's [running] twice every two hours"*.

In addition, Participant 16 in group 3 stated; *"We have a problem here though (…) we can't walk, we don't have any public transport (…) we couldn't walk or cycle to where we have to get to (…) there's nothing about that bit [tranport use] that I could change in my life"*. This shows that the personal circumstance of living in rural areas is a significant physical constraint to adopting certain climate relevant behaviours that is difficult to overcome.

Home comforts refer to the preferences and ideals that participants perceive as important to live comfortably with a high quality of life. For example, discussion from all four focus groups highlighted that participants did not think space heating at 14°C was feasible as it would not be a comfortable temperature to live in. This refers to the impact information provided about heating homes to 14°C (Appendix B, Table 1). Despite the preferences, participants seemed open to change behaviours even if this meant home comforts would be jeopardized, however, some home comforts seemed to be non-negotiable for some participants, such as eating red meat.

Available time was a further perceived physical constraint in groups 1, 3, and 4 because participants did not think they had enough time in the day to adopt certain climate relevant behaviours. For example, planning meals to avoid buying food that will get wasted takes time and walking to the shop rather than driving takes more time. Participants perceived this as time that they were not willing to give to adopting climate relevant behaviours. In contrast, discussions from group 2 took at interesting viewpoint. Discussions revolved around certain climate relevant behaviours taking up less time than alternative behaviours indicating available time as an incentive rather than a barrier. For example, taking shorter showers will save participants time in the morning. Therefore, available time is perceived as a physical constraint by the majority, but can also be an incentive to change behaviour.

Another barrier discussed by participants was education. This barrier was discussed in terms of 'others' facing barriers to adopting climate relevant behaviour rather than the participants themselves facing this barrier. The education barrier refers mostly to climate change and climate relevant behaviour education in academia. Participants in groups 1 and 3 discussed climate change education in schools and seemed to agree that it is inadequate. The discussion in group 2 highlighted that any climate change education in academia seems to be making children feel helpless and not providing solutions to greenhouse gas emission reductions. Again, the discussions from group 2 could have been affected by group dynamics. This is

because the views on education of one participant was more heavily voiced than others. This could have caused attitude polarisation within the group persuading some of the group members to side with the view that education is inadequate and making children feel helpless.

A final barrier identified from the focus group discussions was the barrier of more pressing issues. This refers to issues that are perceived as more significant and more heavily focused on compared to the issue of climate change and adopting climate relevant behaviour. This was most heavily discussed in group 2 again indicating some effect of the group dynamics of different dominant personalities influencing conversation to lead participant's views towards one person's opinion. Participants felt that war around the globe is a more important issue to address than tackling climate change. In addition, participants thought the issues relating to Brexit are discussed more heavily in the news at the current time meaning adopting climate relevant behaviour to reduce greenhouse gas emissions is viewed as less important.

5.2.8 Summary on Panel B Barriers

In summary, Table 4, Panel B highlights five further barriers and physical constraints that are perceived as challenging when attempting to adopt climate relevant behaviours. A common barrier theme identified during the focus group discussions was the physical constraint of personal circumstance relating to the challenges of living in rural locations. In addition, individual preferences seemed to be more of an influencing factor to the perceptions of some of the further barriers, including home comforts, and personal circumstance. Moreover, group dynamics did seem to affect the perceptions of certain barriers. Attitude polarisation seemed to occur in group 2 during discussions around the barriers of education and more pressing issues, which could suggest why some barriers were perceived as more significant issues to some participants. However, again it should be mentioned that participant commitments did not seem to differ between different groups indicating that these further barriers and the group dynamics did not stop any of the participants from choosing to adopt climate relevant behaviour. The information formats will be analysed to identify if impact and normative information can influence willingness to adopt climate relevant behaviour.

5.3 Information Disclosure

The data collected from the focus group discussions and the questionnaires allow for further analysis of the use of impact and normative information in order to discuss the second

research question; how does the promotion of impact information and normative information alter and influence willingness to adopt climate relevant behaviour? Various recurring perceptions were identified from the discussions regarding information. These recurring perceptions were then organised into five common themes. The themes identified thoughts and perceptions from participants relating to the information provided during the focus groups as well as information from elsewhere, outside of the focus group such as from scientific information and information disclosed in the media, referred to as 'outside information'. The awareness theme relates to awareness of climate change attained from outside information, and the rest of the themes relate to information provided during the focus groups as well as outside information. The themes highlight how participants perceive different types of information in order to then analyse the influence of impact and normative information. The information themes are shown in Table 5.

Table 5: Participant thoughts and perceptions sorted into themes identified from the focus group discussions associated with how information is perceived

Group	Themes (thoughts and perceptions from focus group discussions)				
	Awareness	Thought-provoking	Uncertainty and Confusion	Relatable	Sceptical
Group 1	**Jan:** Informed about climate change more than previous generations. Made aware by family who studied environmental studies. **Feb:** Some news channels discuss the topic too much making individuals switch channels.	**Jan:** Focus group emphasised issues already known to participants. **Feb:** Focus group encouraged behaviour change and provoked thoughts on wanting to do more and reverting to previous ways of living. Impact information was shocking.	**Jan:** Information from David Attenborough documentaries is confusing but seems important. **Feb:** Not mentioned.	**Jan:** Not mentioned. **Feb:** Focus groups provided examples for daily changes. Impact information highlighted significance of behaviour change. Outside information does not make individuals feel they can make a difference.	**Jan:** Information on TV can be misleading as individuals are made to feel guilty but are not shown how to help with the issues. **Feb:** Not mentioned.
Group 2	**Jan:** Awareness from university studies, academic career, TV programmes. **Feb:** Focus group did not teach anything new but clarified things. Too much outside information about reducing meat and pushing the public into behaviour patterns.	**Jan:** Focus groups allowed participants to hear different views. **Feb:** The impact information statistics were useful to see.	**Jan:** Outside information is misleading as scientists cherry-pick data. **Feb:** Outside scientific information cannot be understood and the tipping points are unclear.	**Jan:** Not mentioned. **Feb:** Individuals should be able to hear scientific debates to be able to relate to and have some faith in what scientists are saying.	**Jan:** Climate change debate has been taken over by politicians. The public are being fed a partial lie. **Feb:** Sceptical about some of the impact information. Not convinced certain behaviour changes are necessary. Outside information can be manipulated.
Group 3	**Jan:** Small changes in society are interesting. Awareness from TV programmes and college studies. Increased media information about meat consumption. **Feb:** So much climate change information on TV but only on news channels.	**Jan:** David Attenborough documentaries brought the problem to people's minds. Impact information was shocking. **Feb:** Normative information stuck in minds. Impact information was eye-opening.	**Jan:** Individuals confused about climate actions because media information is unclear. Impact information is baffling. **Feb:** Climate change figures are always changing and there is not enough outside information help.	**Jan:** Climate disasters elsewhere are not relatable. Outside information needs to show easy changes. **Feb:** Participants could relate to the normative information but some could not relate. Focus groups made the topic believable.	**Jan:** Disagree with outside information from climate deniers. Participants think people need to be convinced of climate change with information. **Feb:** Participants hear a lot about climate deniers from outside information.
Group 4	**Jan:** Awareness from academic studies, TV programmes and advertisements about small behaviour changes. **Feb:** Climate change has hit mainstream news recently.	**Jan:** Focus group gave the opportunity to hear other's opinions. **Feb:** Focus groups provoked thoughts and made participants think about climate change a lot.	**Jan:** The impact information would be clearer if it stated emissions for the UK as a whole rather than for emission sectors. Confusion around weather and climate change from outside information. **Feb:** Not mentioned.	**Jan:** A page of numbers (impact information) is not relatable. Outside information on climate risks needs to be relatable. **Feb:** Normative information was relatable for some but out of reach for other participants. Participants could not relate to impact information.	**Jan:** Not easy to deem what is a genuine finding from outside information. Scientific language is very absolute which leads to doubt. **Feb:** Not mentioned.

The themes are presented as condensed explanations of participants' perceptions arising from the two-hour focus group discussions, organised into perceptions from the January (Jan) or February (Feb) focus groups. Again, this means the explanations are not representative of all participant thoughts but indicate common or interesting points made by one or more participants. Discussions around the perception of information were manipulated into the focus groups using probing questions. The impact and normative information seem to have mixed effects. This refers to the differing perceptions of the information among participants from all groups, regarding the different themes identified. There does not seem to be any obvious character traits connecting all of the participants that were engaged by the information, apart from the younger participants who unanimously perceived the normative information as not relatable.

5.3.1 Awareness

It is indicated in Table 5 that participants from all groups are aware of climate change. This awareness seems to stem from the media or academic studies. For example, Participant 13 from group 2 indicates awareness from *"a bit of research myself and I think there was a programme on TV about it"*. The awareness of climate change seems to have increased recently for some individuals. Table 5 indicates that groups 1 and 4 discussed awareness of climate change increasing in recent times through TV programmes especially news programmes. For example, Participant 4 in group 1 stated, *"tragedies [extreme weather events] always hit the news (…) it's not necessarily that there are more, but we hear about more"*. This indicates that outside information is making individuals aware of climate change consequences. In the February focus groups, participants from groups 1, 2 and 3 also discussed there being too much information in the media. For example, Participant 3 in group 1 stated *"Sky [a British media company] have had this big thing [programme] on about it [climate change], and it's been on and on about it"*. This suggests that participants perceive there to be too much information in the media. Perhaps too much informative content is being provided to individuals but not focusing on helpful information to encourage change. The existing awareness of climate change among participants means perceptions had already been formed around the topic, which may have affected how the impact and normative information were perceived, and the ability of the information formats to encourage attitude and behaviour change.

In addition, the discussion in group 3 highlighted awareness of climate relevant behaviours already occurring in society. This indicates that some form of both impact and normative information were already available to participants because news stories indicate impacts of climate change and awareness of climate relevant changes in society highlights the normative information of what other people are doing to change. This could suggest that different information formats do influence a behaviour change because many participants were already adopting climate relevant behaviours before the focus groups took place. For example, Participant 12 in group 2 stated, *"I think we're doing most of those [climate relevant behaviours] anyway, except possibly shopping habits".* This suggests that awareness of information has driven some participants to adopt climate relevant behaviours prior to the focus group process.

Participants with academic backgrounds were also present in each group, providing awareness from academic studies as well as the media. This is particularly obvious in group 2 as two participants had strong academic backgrounds on the topic of climate change. This group dynamic may have influenced how participants perceived information as the focus group discussions were very scientifically focused, which seemed to create a dynamic of some participants talking and others listening rather than sharing their opinions. The discussions may have influenced how participants perceived the impact information as the focus group was already very scientifically focused meaning the impact information may have been perceived as 'just more science'. In addition, participants with academic backgrounds on the topic were already aware of the impact information meaning it did not have the same shocking or thought-provoking influence on them as it did other participants.

5.3.2 Thought-provoking

The focus group discussions indicated that both outside information and the focus group information was thought-provoking (Table 5). Outside information attained from TV documentaries was mentioned at thought-provoking in group 3. Interestingly, David Attenborough TV documentaries were mentioned several times in discussions in different groups, suggesting outside information can leave a lasting impression. Furthermore, discussions from groups 1, 2 and 4 highlighted that the opportunity to hear other people's perceptions on climate change and the information was viewed as thought-provoking, indicating influence of communication within a group.

Moreover, the impact information presented in the focus groups provoked thoughts of shock among participants from groups 1 and 3. For example, Participant 7 in group 1 stated, *"it was encouraging because actually I was quite shocked, I knew things were bad but I'd been ignoring it a bit, so I was quite shocked by the statistics [impact information]"*. Furthermore, participants from group 3 perceived the normative information as thought-provoking. For example, Participant 15 from group 3 stated that the normative information *"really stuck in my mind"*. In contrast, participants from group 4 did not mention normative information as thought-provoking.

Perceiving information as thought-provoking can suggest a motivation to adopt climate relevant behaviour. For example, the discussions from group 3 indicated the impact and normative information as thought-provoking and corresponding to this, climate relevant action was taken among participants. For instance, Participant 19 in group 3 stated, *"I did go home after the group and say to my wife we're going to get solar panels, which we have done! We've been talking about it for ages"*. This suggests that information formats disclosed during the focus groups could have encouraged behaviour change by provoking thoughts among participants, although as groups 2 and 4 did not describe the information as thought-provoking this suggestion is not representative of all participants.

As indicated in Table 5, thoughts were provoked in each group by either the information or the focus group process, meaning the information disclosure or the group communication made participants think about the consequences of not acting climate consciously and about how others are adopting climate relevant lifestyles. However, thinking about the behaviours does not prove that the information formats were a driver of climate relevant behaviour changes among participants. In addition, as discussions from groups 1 and 3 similarly discussed the information formats as thought-provoking, it could be suggested in this research that there is not a difference between the ability of impact information and normative information to provoke thoughts of change among individuals. However, this is not representative of perceptions from individuals outside of this focus group research.

5.3.3 Uncertainty and Confusion

The theme of uncertainty and confusion was discussed in all groups relating to the confusion of outside information and the impact information (Table 5). Confusion refers to not being able to clearly understand the messages that the information is trying to present. For example,

discussions in group 2 developed around the idea that scientific data is confusing and uncertain as participants perceived scientists to cherry-pick and manipulate their data. This perception links to existing sceptical views among participants which will be analysed further in section 5.3.5. This could suggest further influence from group dynamics because the participants with the sceptical views around climate science seemed to voice their opinions more dominantly, meaning their views of outside information being confusing may have influenced other group members to agree with these views. In addition, participants in group 3 discussed the confusing nature of scientific information, perceiving climate figures to be always changing. As outside information was described as confusing by participants from all groups, this suggests a need for public information disclosure that reduces uncertainty surrounding climate relevant behaviours.

In addition, Table 5 indicates that the impact information was discussed as confusing in groups 3 and 4 in contrast to participants from groups 1 and 2 who described the impact information as useful. This could suggest that providing different types of information to individuals increases confusion around a topic because groups 1 and 2 were presented with only impact information and did not describe it as confusing. Perhaps providing the impact and normative information during the same focus groups led to increased uncertainty due to the volume of information. For example, Participant 16 in group 3 stated, *"it's baffling"* when asked for thoughts on the impact information provided. In addition, Participant 22 in group 4 stated, *"the information [impact information] would be much handier if it was put in overall terms, each time you read 66% of annual UK travel, if you didn't look at the actual wording, you'd think it was referring to 66% of all emissions, whereas actually it's just referring to UK travel"* indicating that the impact information was confusing in the format it was provided in. Interestingly, the theme of confusion and uncertainty was not mentioned in groups 1 and 4 during the February focus groups, having mentioned the theme in the January focus groups. This could suggest that despite outside information in group 1 and impact information in group 4 being perceived as confusing, the focus group and commitment process may have reduced confusion around the topic of climate change. In contrast, the normative information was not described as confusing by participants from groups 3 and 4.

5.3.4 Relatable

The information provision was also discussed by participants in terms of how relatable it was perceived to be (Table 5). The theme describes an individual's ability to relate to the

information, the identified consequences of human action and the behaviours to their lifestyles. Outside information was perceived as not relatable by participants from all groups. In contrast, participants from group 1 perceived the impact information as relatable opposing to participants from group 4 who perceived the impact information as not relatable. For example, Participant 23 from group 4 stated, *"it [the impact information] doesn't really mean anything to me; a page of numbers"*. This suggests the format that information is disclosed in influences participant's perceptions and ability to relate to it.

In addition, the normative information was heavily discussed by participants in groups 3 and 4 in terms of how relatable it was, but only in the February focus groups. This indicates that participants felt more comfortable to speak openly about the normative information when the normative information provider was not present. The discussions in groups 3 and 4 were mixed in terms of participants who perceived the normative information as relatable and those who perceived the information as not relatable. For example, Participant 15 in group 3 stated, *"I thought the [normative] information was really interesting because I felt like we could all relate, not necessarily to him, but we could relate to what he was doing"*. In contrast, Participant 18 in group 3 stated, *"it's his whole life, and I feel like some of the things [climate relevant behaviours] he does, I'm not going to be able to do for another 30 years until I'm established in my own home with a big earning"*. In addition, Participant 20 in group 4 stated, *"I did feel that having the [normative] information (…) was really helpful because whether you agree with him or not, there's somebody who actually has, over a long period of time, been trying to do something [live climate consciously]"*. In contrast, Participant 21 in group 4 stated, *"it [the normative information] was out of my reach, feeling I'm not going to be able to do that, my lifestyle doesn't enable me to do that, so it can be a bit alienating"*. Therefore, the normative information seemed to divide opinions within groups in relation to the perceptions of the information being relatable.

Participants' perceptions of how relatable the normative information was seemed to be influenced by personal circumstance and group dynamics. The younger participants in groups 3 and 4 did not find the normative information relatable compared to the perceptions of older participants in the same group, perhaps because of the larger difference in age between younger participants and the normative information provider. In addition, the personal circumstance of an individual's financial status seemed to affect how participants perceived the normative information. Some participants could not relate to it because they perceived the

climate relevant behaviours presented by the normative information provider as only possible with a secure financial status. Therefore, the effect of information disclosure on influencing behaviour change seems to be affected by individual's ability to relate to the information to see how behaviours would fit into their lifestyles.

5.3.5 Sceptical

Taking a sceptical viewpoint on information about climate change received outside of the focus group was another theme that emerged from the discussions. Sceptical views were mainly related to outside information, however, existing sceptical views around climate change information may have influenced the perceptions of the impact and normative information and thus the ability of the information to encourage climate relevant behaviour. As indicated in Table 5, discussions from groups 1, 2, and 4 highlight sceptical attitudes relating to outside information and what participants perceived as misleading information in the media and scientific information being one-sided and possibly over-exaggerated. In contrast, the discussion between participants in group 3 focused on disagreeing with climate change deniers and trusting outside information.

Sceptical attitudes towards information were predominantly observed from participants in group 2. Three participants seemed to be slightly sceptical towards climate change information, with one participant's views coming across more strongly than other views came across. Corner et al., (2012) studied scepticism towards climate change, highlighting that scepticism refers to "uncertainty about the impact of human activity on the climate" (Corner et al., 2012, p. 465). In addition, Corner et al., (2012) suggest scepticism may result from thoughts on how climate change is communicated. Participants from group 2 indicated this uncertainty towards climate change information and how it is communicated, for example, Participant 11 in group 2 stated, *"the BBC for instance, I understand they've got a policy now where they will no longer give climate sceptics any air time (…) I think what ought to be happening is that climate sceptics should have a forum, they ought to be able to discuss it"*. Participants from group 2 also seemed sceptical about the impact information. For example, Participant 11 from group 2 stated *"I do question that percentage [percentage reduction in electricity consumption resulting from lowering the temperature on the washing machine], I really do, my gut instinct is that it's not true"*. The normative and impact information were not discussed in terms of sceptical perceptions in other groups.

Group dynamics seemed to influence the discussions around sceptical perceptions, particularly in group 2. The participants voicing their sceptical perceptions of climate change information had academic backgrounds relating to climate change and were much more vocal than other participants within the group. Similarly to previous mentions of group dynamics in group 2, participants with sceptical perceptions dominated the discussion. This seemed to persuade other participants into agreeing with these perceptions. In addition, participants in this group were not able to hear and be influenced by views from younger generations as all participants in group 2 were within an older age group. Another group dynamic to mention is the gender compositions making up the different groups. Groups 1 and 3 had a gender imbalance towards female participants. Interestingly, this seemed to create more of a responsive, open discussion. In addition, the body language of participants in these groups seemed to show more agreement, with a lot of nodding of heads in agreement to what other participants were saying. This could have influenced discussions in the groups as participants may have been persuaded to agree with the dominant group opinion. For example, participants in group 3 unanimously agreed that information that was sceptical about climate change was wrong. Although this is the ideal view, the gender imbalance within the group may have influenced participants to agree rather than voice any different opinions. Therefore, group dynamics could also have had an influence on the discussions regarding sceptical perceptions.

5.3.6 Information as Encouraging

In addition to Table 5, questionnaire data relating to whether the participants found the impact and normative information encouraging are presented in Appendix E, Table 4, and questionnaire data relating to what information formats participants deem as most encouraging for adopting climate relevant behaviours are indicated in Appendix E, Table 5.

Data indicated in Appendix E, Table 4 highlight that overall more participants perceived the normative information as encouraging than not, and there is more of an even balance between participants who felt the impact information was encouraging and those who did not. However, when looking at the data for each group, more participants perceived the impact information as not encouraging in groups 1 and 2 and more participants perceived the impact information as encouraging in groups 3 and 4. In comparison, the majority of participants in group 3 perceived the normative information as encouraging, and the perceptions regarding the normative information in group 4 were evenly balanced. The data indicate that the effect

of information formats differ between individuals. It is difficult to say, therefore, if the information formats are successful instruments to encourage climate relevant behaviour because it seems to depend on the individual. For example, in group 2 zero participants thought the impact information was encouraging in contrast to the other three groups, but all participants from all groups attempted to commit to climate relevant behaviours, many for the full four-week period (Table 3). It should also be noted that participants may have found the information encouraging but ultimately decided to commit to the climate relevant behaviours for other reasons, such as financial reasons.

A limitation to note is the extent of the truthfulness of the answers provided by participants. A select few participants in group 1 seemed to contradict their perceptions of the impact information shared during the oral discussions of the focus groups with their questionnaire answers. This may limit the validity of results. It is interesting as group 1 was heavily imbalanced towards female participants which seemed to influence the discussions with participants choosing to agree with the perceptions of others. This may be the cause of the contradictions between oral discussion and questionnaire answers however; the contradictions did not seem to occur in group 3 which also had a female gender dominance. Perhaps participants were influenced more by group discussion in group 1 as there were more participants involved in the discussions. Participants may have chosen to agree with the dominant group perceptions in the discussions and felt more comfortable to be honest in the questionnaires as their answers were not public.

The success of information as a policy instrument and why participants felt motivated to adopt climate relevant behaviours can be further analysed using the results indicated in Appendix E, Table 5. The table indicates perceived information types that would be most significant in encouraging an adoption of climate relevant behaviour. For example, cost expenditure information was chosen as the most significant information format for encouraging a behaviour change by participants in three of the groups. This suggests that for some individuals, adopting climate relevant behaviours is based on financial incentives rather than the incentive of reducing greenhouse gas emissions. The results show that impact information was chosen as the most influential information type in two of the groups. This again suggests that the effect of different types of information disclose depends on the individual and what information they can relate to the most. Information that shows the rest of the world are committing to the same behaviours was stated as the most influential

information type by participants in group 2. This hints slightly at the need for normative information to break down the free rider problem barrier. If normative information could be provided on a wider scale rather than just individuals indicating their behaviour changes in a neighbouring town, then perhaps it would be more of an influential information format to encourage adoption of climate relevant behaviour.

5.3.7 Summary on Information Disclosure

In summary, it can be suggested from this research that participants perceive outside information relating to climate change and climate relevant behaviours as confusing, not relatable, and some participants are sceptical to the truth of the outside information. Existing awareness of climate change was shared by participants from all groups, however, awareness resulting from academic studies seemed to influence discussions more prominently. This was especially the case in group 2 as the participants with academic backgrounds relating to climate change seemed to dominate the discussion, creating attitude polarisation with other participants being persuaded into agreeing with their sceptical views of climate change information. This suggests that group dynamics has an influence on perceptions of information.

To summarise, the impact and normative information seemed to have mixed effects among participants referring to the differing participant perceptions of the information regarding the themes identified from the focus group discussions. Some participants found the impact and normative information thought-provoking, in some cases encouraging climate relevant action, but other participants did not describe the information as thought-provoking. Participants from groups 3 and 4 found the impact information confusing in contrast to participants from groups 1 and 2 who did not. This could suggest that providing different types of information at once renders information confusing to digest. However, the normative information was not described as confusing, and ultimately seemed to engage participants more than the format of the impact information. Moreover, perceptions of the information as relatable seemed to split opinions between groups. In the same way, the impact information was perceived as relatable for participants in group 1 but not for participants in group 4. The perceptions of the information seemed to be mixed between participants within groups 1, 3 and 4, however participants within group 2 seemed to agree on perceptions of the information. This could suggest an influence of the group dynamics within group 2.

It seems that various group dynamics influenced the perceptions of the impact and normative information. The domination of discussions by certain participants, particularly in group 2, seemed to have an influence on how other participants in the groups perceived information. Generally, participants seemed to agree with the dominant viewpoints within the groups. Moreover, the age of participants, the female majority occurring in groups 1 and 3, and the personal circumstances of participants also seemed to influence perceptions. The truthfulness of answers may have been influenced by these group dynamics; however, the questionnaire provided the opportunity for participants to be truthful without influence from the various group dynamics. In addition, the impact and normative information seemed to have mixed effects on encouraging participants to adopt climate relevant behaviour as participant perceptions of the information differed within groups. However, all participants committed to climate relevant behaviours. Also, the commitment choices as well as the duration of the commitments did not seem to differ between groups. This suggests that some individuals perceive climate relevant behaviour as important for other reasons not relating to climate benefits, and the diversity of reasons highlights that some individuals find the impact and normative information significantly encouraging but some perceive other information formats as more encouraging. It is important to note again, that the summary points made are only representing this case, rather than being representative of the perceptions of wider populations.

5.4 Communication within a Group

The method of communication within a group is a key influential aspect to analyse, corresponding to the effects of group dynamics, on the adoption of climate relevant behaviour. The use of group settings for communication is analysed through the participant discussions and questionnaire answers to help answer the research question; how does the communication within a group setting influence the decision to adopt climate relevant behaviour? The influence of communication within a group of individuals will be further analysed to identify if communication effects perceptions of the impact and normative information, thus, any resulting effects of communication on motivations and perceived responsibilities to adopt climate relevant behaviour.

This research used communication within a group setting to encourage group discussion regarding the information disclosed. As well as observations made during the focus groups, the questionnaires were used to identify any influence of communication on participants'

perceptions. A question was asked; 'what encouraged you to attempt to adopt climate relevant behaviour(s)?' providing different options for participants to choose from. The options were created based on scenarios within the focus groups that could have influenced participants' motivations; however, an 'other' option was created for participants to state any influencing factors that were not mentioned. The motivating options alongside the number of participants who chose each option from each group is shown in Table 6.

Table 6: The number of participants encouraged to adopt climate relevant behaviours as a result of different factors relating to the focus group process

Group	Motivations for Adopting Climate Relevant Behaviours	Number of Participants Per Group Encouraged by the Motivation
1	Information provided during the January focus group	5
	Hearing perspectives on the subject from others during the January focus group	2
	Learning more about climate change during the January focus group	4
	Information from outside of the January focus group	3
	Pressure to adopt climate relevant behaviours felt from the focus group process	1
	Other: • Financial and ethical • Something I knew I had to improve and the group gave me the opportunity • TV documentaries • It has always been on my mind	4
2	Information provided during the January focus group	1
	Hearing perspectives on the subject from others during the January focus group	0
	Learning more about climate change during the January focus group	0
	Information from outside of the January focus group	0
	Pressure to adopt climate relevant behaviours felt from the focus group process	1
	Other: • To reduce the cost of water usage • To reduce the cost of electricity bills • I'd agreed to take part in the group so decided to commit but did not feel pressured into it	3
3	Information provided during the January focus group	6
	Hearing perspectives on the subject from others during the January focus group	5
	Learning more about climate change during the January focus group	6
	Information from outside of the January focus group	3
	Pressure to adopt climate relevant behaviours felt from the focus group process	2
	Other: • Media	1

Table 6: The number of participants encouraged to adopt climate relevant behaviours as a result of different factors relating to the focus group process (continued.)

4	Information provided during the January focus group	5
	Hearing perspectives on the subject from others during the January focus group	3
	Learning more about climate change during the January focus group	2
	Information from outside of the January focus group	3
	Pressure to adopt climate relevant behaviours felt from the focus group process	2
	Other: • Genuine desire from fellow participants to try themselves to commit inspired me to take a deeper interest and find suitable commitments • Prior knowledge, challenge to self, and recognised that I could do better	2

From this data, communication does not seem to be the most motivating factor, as the most significant motivation chosen by participants was information provided during the January focus group. The diversity of further reasons why participants chose to commit to the climate relevant behaviours can be seen in Appendix F, Table 6. This highlights that the majority of participants chose to commit to behaviours for reasons that did not relate to reducing greenhouse gas emissions.

Despite this data, communication within a group still seemed to have an influence on participants' motivation to adopt climate relevant behaviour and participants' perceptions of the impact and normative information. The motivation options of hearing perspectives on the subject from others during the January focus group and pressure to adopt climate relevant behaviours felt from the focus group process highlight that communication within a group setting had an influence on the participants' decisions to adopt behaviours (Table 6). This suggests that communication was encouraging among participants because other perspectives on the information could be heard and the group setting exerted pressure to commit to climate relevant behaviour. For example, Participant 22 in group 4 selected the 'other' option for the choice of motivation to adopt climate relevant behaviours, specifying that witnessing a genuine desire from fellow participants to try themselves to commit encouraged a deeper interest from the participant to find suitable behaviour commitments. This represents influence from communication within the group setting, as the discussions within the group were encouraging.

In addition, the data presented in Table 6 identify the motivation of hearing from others as an influencing factor for participants from all groups apart from group 2. This is interesting as observations from the focus group process suggest that hearing from others did influence participants' perceptions in group 2. Communicating within a group setting created opportunities for several individuals to voice their perceptions meaning all participants listened to the perceptions of several other individuals. As a result, other group members could have influenced participants' perceptions and their interpretation of the information. This seemed to occur in group 2. One participant's perceptions on climate change and the impact information dominated the discussions. All participants seemed to agree with these perceptions indicating a process of attitude polarisation and thus participant interpretations of the information may have been manipulated by the dominant perceptions of the discussions. The difference between the observations of the group discussion dynamics and the data in Table 6 suggests that participants may not have realised that their interpretations were being influenced by other individuals or did not want to admit that this influence had occurred. The opportunity for this influence on interpretations was created because of the communication within a group.

Moreover, the data presented in Table 6 identify pressure as an influencing factor for one or more participants in all of the groups. This indicates that the communication in a group setting causes feelings of pressure among individuals. Interestingly, more participants chose this option as influential from groups 3 and 4 compared to participants from groups 1 and 2. This could suggest that an individual providing normative information face-to-face within a group could increase the pressure of the group setting. Participants may have felt more pressure to adopt behaviours in groups 3 and 4 because the focus group moderator as well as the normative information provider were both present promoting a normative demand to act. Participants may have felt pressured to commit to climate relevant behaviours as a result of the demand for action from two individuals. This contrasts to groups 1 and 2 as a normative information provider was not present. However, pressure may still have been created from the demand for action from the focus group moderator as well as the participation in a commitment strategy to commit to climate relevant behaviours. The use of a commitment strategy may have increased pressure among participants to adopt climate relevant behaviours because all participants were forming their commitment during the group, meaning the commitments were perceived as public. This indicates that communication within a group setting could influence behaviour change due to it being a pressurised situation.

Further group dynamics as a result of communication within a group seemed to occur. For example, in groups 1 and 3 there were more female participants than male participants. Interestingly, there were a lot more gestures of agreement among participants in these groups, such as nodding of heads and murmurs of agreement. This could also suggest an influence on participants' interpretations of the information because it seemed that the majority of participants preferred to agree with the dominant group perceptions, perhaps because the gender imbalance created a more open, responsive dynamic compared to other groups. This seemed to affect the validity of the discussion findings for some participants in group 1 as discussion points seemed to contradict the questionnaire answers of some participants. The gender imbalance could have had an influence on this. In addition, hearing from others may have also influenced participants' understanding of the impact and normative information in other groups as well as group 2. Participants answered each other's questions and provided different insights into some of the information provided, enabling the opportunity to learn from other participants.

The influence of the communication in a group setting was also evident from statements made by the participants during the discussions. For example, Participant 15 in group 3 stated, *"it [the focus group process] makes you think about it [climate change]. Everybody's in the same boat, everyone seems to have the same sorts of opinions"*. This highlights that the use of a group setting to provide information allows individuals to hear opinions from others making them feel like it is a collective effort. In addition, Participant 23 in group 4 stated, *"I don't think it's a topic that comes up very much (…) so it's quite nice to have the opportunity to bring up some thoughts or hear what other people do"*. Again, this indicates that communication within a group motivates individuals to adopt climate relevant behaviour.

5.4.1 Summary on Communication within a Group

Despite participants not perceiving communication as the most motivational aspect behind their behaviour choices, communication within a group and the influence of the group setting does seem to encourage participants to adopt climate relevant behaviour. The ability to hear from other participants and the pressure exerted on the participants as a result of the group setting influenced participant's interpretations of the information provided during the focus groups. Hearing from others seemed to influence perceptions by increasing participants' opportunities to understand the information. Furthermore, the pressure of the group situation

may have been enhanced by the demand for action from the focus group moderator and/or the normative information provider using a commitment strategy.

Corresponding to the influence of hearing from others and group pressure, group dynamics such as outspoken individuals and gender imbalances may have also influenced participants' interpretations of the information by persuading participants to agree with the dominant view within the group. Therefore, communication within a group setting seems to influence participants' perceptions of impact and normative information, thus the motivation to adopt climate relevant behaviours. As the information formats created mixed effects on encouraging participants to change their behaviour and all participants did commit to adopt behaviours, the research seems to indicate that communication within a group and the influence of the group setting encourages individuals to adopt climate relevant behaviour.

6 Discussion

Referring to the institutional theory presented by Vatn (2015), the results from this research indicate that the influence from both the individual dilemma and the social dilemma affect individuals' perceptions of focal barriers to adopting climate relevant behaviour and the impact and normative information disclosed. The individual dilemma is referring to the corresponding influence of individual preferences associated with preferred lifestyle patterns, as well as personal norms internalised and embedded by society promoting social obligations to adopt climate relevant behaviour. The social dilemma acts as an influence on individuals' decisions to act on moral obligations, going against other people's preferences. The results also indicate that communication within a group and the group setting itself influence individuals' perceptions and decisions to adopt climate relevant behaviour.

The focal barriers identified in this research were perceived and experienced by participants from all four groups. However, not all participants experienced these barriers. For example, Participant 6 from group 1 did not experience any barriers. This may be a result of the climate relevant behaviour commitments chosen by the participant. Participant 6 chose to commit to turn off the radiator in the spare room and to reduce the washing machine to 30°C more often. The participant may not have experienced any barriers because the behaviours adopted did not significantly affect household lifestyle, thus did not significantly go against individual preferences. However, other participants also committed to these behaviours and did experience barriers, suggesting individual household consumption preferences had an influence on perceived barriers.

All other participants experienced one or more of the focal barriers identified. The focal barriers of home comforts, habit, economic barriers, and personal circumstance seemed to be barriers promoted by the individual rationality of some of the participants. This is because climate relevant behaviours were inconvenient and disrupted lifestyle patterns making these barriers difficult to overcome. For example, the home comfort of warmer temperatures for space heating is preferred because it is more comfortable to live in a warm house. In addition, barriers also came in the form of physical constraints. These included personal circumstance, specifically living in a rural area, and perceived available time among participants. Physical constraints made adopting climate relevant behaviours difficult, for example, the poor public transport facilities in rural towns made the use of public transport more inconvenient.

Therefore, as well as policy instruments to encourage climate relevant behaviour, governments should target rural communities to help improve facilities that make it difficult to adopt climate relevant behaviour.

The focal barriers also seemed to challenge the norms of society, which promote social rationality thus a moral obligation to commit to climate relevant behaviour among the participants. This individual dilemma of corresponding individual preferences and internalised personal norms seemed to be experienced by participants as the moral obligation to act was challenged by the free rider problem barrier and the power barrier. All participants accepted the social responsibility to adopt climate relevant behaviours as all participants chose to commit to one of more behaviours. However, the decision to behave climate consciously was challenged because participants felt the responsibility and power to reduce greenhouse gas emissions fell on governments and larger corporations, rather than the individual. Participants could not see what positive difference they could make with their behaviour changes, but wanted governments and corporations to facilitate the benefits of reduced emissions.

Furthermore, the focal barriers of the social barrier specifically relating to barriers from family members, education, and more pressing issues than reducing greenhouse gas emissions were experienced because of the social dilemma. Participants seemed to feel a common moral obligation to commit to the climate relevant behaviours, however, these obligations went against the individual preferences of other individuals. The social barrier was the most significant focal barrier identified. Several participants perceived this barrier as a potential issue during the January focus groups and then experienced this barrier during the climate relevant behaviour commitment attempts. Their moral obligation to act went against the individual preferences of family members, which challenged their ability to commit to the behaviours. For example, a social barrier experienced by Participants 20 and 21 from group 4 was the individual preference of meat-based meals of a family member, causing a barrier for the participants to reduce their red meat consumption. Despite the focal barriers, all participants chose to commit to climate relevant behaviours suggesting that the focal barriers do not stop participants from attempting all relevant behaviours. However, this choice to overcome barriers and attempt to adopt certain behaviours may not be a result of the information provided because the impact and normative information disclosure resulted in mixed perceptions among the participants.

The promotion of impact information seemed to cause mixed effects among participants. Mixed effects refer to differences in participant perceptions in terms of how thought-provoking, relatable, and confusing or uncertain the information is perceived to be. Participants from all groups had mixed perceptions of the information. Specifically, participants from groups 1, 3, and 4 had mixed perceptions of the impact information within the same group, contrasting to participants from group 2 who seemed to agree regarding perceptions of the information.

Some participants from all groups perceived the impact information as confusing and not relatable. Referring to the norm activation theory proposed by Schwartz (1977), the information did not seem to increase the awareness of consequences of inaction for some individuals. Therefore, the information did not activate personal norms and promote the social responsibility to adopt climate relevant behaviour. Thus, the impact information did not encourage some participants to go against individual preferences by adopting climate relevant behaviours. For example, participants from group 4 perceived the impact information as just a page of numbers and could not relate to it. This suggests that in order to increase awareness of consequences of human behaviour, impact information needs to be presented in a format that is relatable and engaging. The mixed perceptions of the impact information do not seem to occur in group 2 as all participants seemed to agree that the information was useful to read but not encouraging to adopt climate relevant behaviour. Despite the impact information not activating the personal norms to motivate a willingness to act among all participants, all participants did commit to adopt climate relevant behaviours suggesting the influence of another factor for encouraging the adoption of climate relevant behaviour.

In addition, the impact information was perceived as confusing by some participants from groups 3 and 4. The emissions statistics could not be understood therefore the impact information did not increase awareness of consequences among some participants. It is interesting that only participants from groups 3 and 4 found this information confusing. This could suggest that presenting two formats of information makes individuals confused as participants from groups 3 and 4 were presented with the impact and normative information. On the other hand, some participants perceived the impact information as thought-provoking, relatable and clear in contrast to other participants. For example, participants from group 3 thought the impact information regarding emissions from food waste was shocking. This

suggests that the impact information did activate personal norms to motivate adoption of climate relevant behaviour because the awareness of the consequences of certain human actions seemed to be understood by some participants. In addition, the activation of personal norms as a result of the impact information seemed to motivate adoption of the behaviour because it is socially appropriate, however, the social dilemma seemed to occur within groups. The adoption of climate relevant behaviour seemed to be influenced by the different preferences of certain group members. Specifically, one participant in group 2 was highly aware of the topic under discussion prior to the focus group process and was also sceptical about certain statistics included in the impact information. The sceptical viewpoints and individual preferences of this participant seemed to cause attitude polarisation within the group and influenced an agreement of this perception of impact information from other group members rather than the participants going against this dominant perception. However, all participants from group 2 still committed to attempt climate relevant behaviours suggesting further influencing factors.

In addition, the awareness of climate change among participants before the January focus group also seemed to affect the influence of the impact information on encouraging a willingness to adopt climate relevant behaviour. Higher awareness seemed to cause existing perceptions of this information making it difficult to increase awareness of consequences of inaction.

Similarly, the normative information also seemed to create mixed effects. Participants from groups 3 and 4 perceived the information differently in terms of how thought-provoking and relatable the information was. Interestingly, no participants seemed to perceive the normative information as confusing meaning they could understand the descriptive norms presented. This is an important result to mention as participants from all groups agreed that outside information is confusing and some participants perceived the impact information as confusing, indicating that understandable information is needed.

Some participants did not think the normative information was thought-provoking or relatable. Referring to the institutional theory, it can be suggested that the information did not promote a moral obligation to act as it did not seem to influence some participants to go against their individual preferences. For example, some participants, including the younger aged individuals, in groups 3 and 4 felt the information was not relatable to their lifestyles

due to age differences between the normative information provider and certain participants as well as differences in employment and financial statuses. Furthermore, the perceptions of the normative information seemed to influence a change in perceptions of the economic and power barriers. In the February focus groups, some participants suggested that adopting climate relevant behaviour can only have an effect if it is adopted by powerful corporations and governments rather than the individual, and some participants perceived adopting climate relevant behaviour as an expensive lifestyle. This differs from perceptions of these barriers shared within the January focus groups suggesting the normative information influenced these perceptions.

In contrast, some participants from groups 3 and 4 did seem to feel a moral obligation to act, promoted by the normative information. The information was perceived as thought-provoking and relatable by some, indicating that some participants were encouraged to go against individual preferences. This could result from personal norms internalising the social responsibility to adopt climate relevant behaviours being promoted by the descriptive norms presented by the normative information provider. For example, Participant 18 in group 3 attempted to use public tranport despite the behaviour being very inconvenient.

The normative information highlighted 'common' consumption of this behaviour indicating a socially appropriate lifestyle to adopt. As a result, the normative information seemed to challenge the social dilemma by encouraging participants to accept the moral obligation to adopt the behaviour and go against family preferences. Therefore, the information caused mixed effects among participants but the format of the normative information seemed to more effectively engage participants compared to the format of the impact information. The mixed effects are also indicated as participants stated different reasons for committing to the climate relevant behaviours. The majority of participants seemed to indicate other reasons for committing to the behaviour, not relating to greenhouse gas reductions. The mixed effects of the information and the results indicating that all participants committed to one or more climate relevant behaviours suggest that the influence of communication within a group setting must have had an encouraging effect on participants' choices to adopt climate relevant behaviour.

The results indicate that communication within a group setting influenced decisions to adopt climate relevant behaviour. The mixed effects of the impact and normative information

suggests that for some participants, encouragment to adopt behaviours came from elsewhere. In addition, participants agreeing to commit to climate relevant behaviour despite existing sceptical viewpoints suggests that the group setting had a significant influence on participants' willingness to adopt the behaviour. The influence of group communication includes the influence of group discussions regarding the information, the influence of the pressure felt from the group setting and the influence of group dynamics.

Communicating within a group allowed participants to hear from other group members when discussing the impact and normative information. Referring to the functional theory adopted by Gouran and Hirokawa (1983) (as cited in Waldeck et al., 2002), the opportunity to hear other individuals' perceptions allowed participants to better understand the information. During the focus groups, participants seemed to ask each other questions and provide various insights into the impact information. This suggests that the communication of information in a group setting may have increased understanding of the impact information, thus encouraging individuals to act against individual preferences. Individuals could better understand issues, alternatives and challenges relating to climate relevant behaviour because of the group discussions and hearing from other participants. Therefore, group communication may have influenced the decision to participate in climate relevant behaviour because responsibility to act was discussed among participants, increasing the awareness of the consequences of inaction.

Furthermore, the opportunity to hear and learn from other participants may have enabled further deliberation of norms. The group discussions regarding the normative information and the descriptive norms highlighted different individual preferences. Referring to the deliberative democratic theory influenced by Habermas (1979) (as cited in Kelly, 2004), the group democratic discussions may have influenced participants as each individual was deliberating on different personal norms and preferences. This may have encouraged participants to accept the responsibility to commit to climate relevant behaviour because of the moral obligation promoted by the deliberation of norms. The results indicate that the opportunity to hear from other individuals was not claimed as an encouraging factor by all participants, however, participants may not have realised or did not want to admit that they were being influenced by other group members.

A further influence of communication within a group is the pressure felt by the group setting. As long as individuals feel they can choose if they adopt climate relevant behaviour, pressure seems to be an effective tool to influence collective behaviour change. The pressure of the group setting seemed to encourage participants to overcome individual preferences and adopt climate relevant behaviour despite differing family preferences. This may be because the group setting had pressures from the normative demand to act encouraged by the focus group moderator. In addition, pressure resulted from the presence of other participants taking part in the commitment strategy because the commitment process was facilitated in a public space (the group setting). A pressurised situation was created because participants may have felt the responsibility to adopt behaviours was shared by all group members.

In addition, group dynamics involved within group communication seemed to influence participants' decisions to adopt climate relevant behaviour. For example, gender differences in groups seemed to affect communication. In groups 1 and 3 there were more female than male participants. This is interesting as there seemed to be more agreement and gestures of agreement such as head nodding within these groups. This could suggest that the open, responsive dynamic possibly created by the gender imbalance influenced participants to agree with certain perceptions of other group members. This seemed to affect the validity of the discussion findings in group 1 as there were a few contradictions between views shared by participants in the oral discussions and the questionnaire answers. The use of the questionnaire seemed to reduce this validity limitation because group discussion was not an influencing factor when completing the questionnaire. In addition, the age imbalance within group 2 may have influenced perceptions of the information formats because perceptions from younger generations could not be heard. Therefore, the dominant views influencing other participants' perceptions were all views from older individuals.

Furthermore, different personalities making up the group dynamics seemed to influence the communication between participants, thus the perceptions of the information and decisions to adopt climate relevant behaviour. For example, one participant in group 2 seemed to have a more confident personality and seemed to speak a lot more than the other members of the group. This created a dynamic whereby this participant talked while the other participants listened rather than voicing their own thoughts. This participant held sceptical views meaning the group discussions were significantly based on sceptical perceptions of the information. Again, despite this participant dominating the discussions with sceptical views about climate

change information, all participants still committed to adopt climate relevant behaviour, suggesting that the influence of the group setting was significant in promoting a responsibility to adopt climate relevant behaviour.

The results suggest that the influence of communication within a group and the pressure from the group setting significantly influenced the decisions to adopt climate relevant behaviour. This is because participant behaviour commitments and the duration of the commitments did not seem to differ between groups suggesting the effects of the impact and normative information did not differ greatly. The communication within groups seemed to be more of an influential factor than the impact and normative information. The communication within groups facilitated an agreement to adopt these behaviours, limiting certain barriers that hindered perceived obligations to act such as the free rider problem. The impact and normative information caused mixed effects indicating that the policy instrument is effective for some sections of the sample population. This could suggest that information could be a successful tool to encourage climate relevant behaviour if the information was tailored to relate to different sections of the population, such as different age groups.

7 Conclusion

In conclusion, contrasting individual preferences and norms as well as other people's preferences seemed to influence perceived barriers to adopting climate relevant behaviour and perceptions of impact and normative information in this research. All participants in the study decided to commit to one or more climate relevant behaviours during the focus group process. There were no significant differences between participant commitment choices and the duration of the commitments between each group despite participant perceptions of information differing between groups. This suggests an influence of communication within the group as well as the group setting on encouraging individuals to adopt climate relevant behaviours.

Referring to the research question; 'what are the focal barriers for individuals adopting climate relevant behaviour?', the focal barriers identified in this research were; the free rider problem, power, economic barriers, social (family) barriers, habit, personal circumstance, home comforts, perceived available time, education, and more pressing issues perceived as more important than reducing greenhouse gas emissions. Participants seemed to be challenged by the preferences of home comforts, habits, economic aspects, and personal circumstance. In addition, participants seemed to be challenged by physical constraints including the personal circumstance of living in a rural area and perceived available time. Rural areas should be targeted by government action to reduce the physical constaints of living in rural areas in order to reduce the difficulty of adopting climate relevant behaviour.

Leading on, the obligations to act were challenged because participants felt the responsibility to adopt climate relevant behaviour fell on more powerful governments and corporations rather than the individual, highlighting the barriers of the free rider problem and power. Furthermore, other people's preferences acted as a barrier to behaviour change. This refers to the focal barriers of social (family) barriers, education and more pressing issues. The social barrier was the most significant barrier identified in this research because the preferences of family members seemed to considerably influence participants' ability to adopt climate relevant behaviours. However, as all participants attempted one or more climate relevant behaviours, the focal barriers identified did not stop participants from adopting all relevant behaviours.

Leading on from that, the perceptions of impact and normative information also seemed to be influenced by individual preferences, personal norms and other people's preferences. Referring to the research question; 'how does the promotion of impact information and normative information alter and influence willingness to adopt climate relevant behaviour?' it can be concluded that the information had mixed effects among participants.

The impact information had mixed effects as the information was perceived as not relatable, confusing, and not thought-provoking by some participants. Therefore, the information did not increase awareness of the consequences of inaction in order to motivate participants to move away from individual preferences and adopt climate relevant behaviour. On the other hand, the information increased awareness of consequences and activated personal norms to adopt climate relevant behaviour for some individuals because the information was perceived as thought-provoking, relatable, and clear. However, the individual preferences of other group members also seemed to influence perceptions of this information. For example, the sceptical viewpoints and individual preferences of a participant in group 2 seemed to influence perceptions of the impact information of other group members. Despite these sceptical views observed in group 2, behaviour commitments were still formed by all participants. Existing awareness of the information also seemed to influence perceptions. Existing views on climate change and the impact information made it more difficult to increase awareness of consequences of inaction. This indicates that impact information may not be an adequate policy instrument to change attitudes.

The normative information also seemed to have mixed effects among participants. A moral obligation to act and move away from individual preferences was not promoted as the information was perceived as not relatable and did not provoke thoughts for some participants. It seems that the normative information created perceptions of climate relevant lifestyles as expensive and not able to make a significant difference in climate mitigation efforts. On the other hand, the normative information did promote social responsibility and a moral obligation to act among some participants as the information was perceived as relatable and thought-provoking. As there were no obvious differences between the climate relevant behaviour commitments chosen by participants from each group and no difference between the duration of the commitments between participants, there is no clear difference between the effects of the information formats on influencing willingness to adopt climate relevant behaviour. However, the normative information was not perceived as confusing by any

participants in contrast to the impact information. In addition, the normative information seemed to engage participants more than the impact information. This indicates that normative information may have potential for a successful policy instrument because it was agreed by participants from all groups that outside information is confusing, highlighting a need for information on climate relevant behaviour that is engaging and can be understood. If normative information could promote climate relevant lifestyles as beneficial for the individual, such as indicating cost saving benefits from adopting the behaviours, this information could be an appropriate policy instrument.

The mixed effects of the impact and normative information along with the results showing that all participants committed to one or more climate relevant behaviours indicates an influence from the communication within a group. Referring to the research question; 'how does the communication within a group setting influence the decision to adopt climate relevant behaviour?', it can be concluded that individuals were encouraged by the communication within a group and the group setting itself when deciding to adopt climate relevant behaviour.

The communication within a group increased the opportunity to hear from other individuals which increased participants' understanding of the issues relating to climate relevant behaviour, any alternative behaviours and any potential obstacles to adopting the behaviour. This promoted an obligation to act among participants. In addition, hearing from others allowed participants to deliberate on personal norms as well as other group member's preferences. Moreover, communication within a group influenced perceptions of the impact and normative information because of the different group dynamics. This includes the age, gender and different personality dynamics within groups. Group dynamics seemed to particularly influence discussions in group 2 as participants seemed to agree with the dominant perception in the group. A participant with a more confident personality seemed to voice sceptical views of climate information more so than other group members potentially leading to attitude polarisation. However, despite the influence from group dynamics and differing perceptions, all participants committed to climate relevant behaviours indicating an influence of the group setting itself.

The group setting created a pressurised situation. The responsibility to commit to climate relevant behaviours were shared by all participants, pressuring them to agree to change their

behaviour. In addition, the normative demand to act from the moderator created pressure within the groups. Participants seemed to feel a moral obligation to adopt climate relevant behaviour because they had agreed to take part in the focus group process. The pressure exerted on participants from the group setting seemed to be effective in achieving a behaviour change among participants. As long as individuals feel the decision to commit to behaviour is their choice, then pressure seems to be a useful tool to encourage collective action. It could be suggested that combining normative information tailored to different sections of the population and communication within a group could be a successful policy instrument to encourage climate relevant behaviour as this would combine clear, engaging information and group responsibilities to promote a moral obligation to adopt climate relevant behaviour.

The various limitations discussed in this study should be considered in these concluding remarks. The sampling methods decreased the representativeness of this study and reduced the capacity to generalise the results. However, the study findings can be used as a starting point for further research into the use of information as a policy instrument to encourage climate relevant behaviour on an individual level in the UK. In addition, the uncontrolled group dynamics within groups seemed to have a significant influence on the study, suggesting that group dynamics should be considered in further study.

7.1 Further Work

Appropriate further work on the study of information as a policy instrument to encourage climate relevant behaviour should involve sampling a more representative and generalisable group of participants. This could be achieved with a random sample, with the aim of also achieving a higher total number of participants to gather discussion statements that more accurately indicate reality.

Furthermore, including a control group in the focus group process could allow for more certain conclusions on the effect of information as an instrument to encourage climate relevant behaviour. The control group could involve participants discussing the topic with no presentation of information disclosure or a control group that is provided with information but does not meet as a group. This could enable further analysis of the effect of information as well as the effect of group communication.

8 References

Aasen, M. & Vatn, A. (2018). Public Attitudes Toward Climate Policies: The Effect of Institutional Contexts and Political Values, *Ecological Economics, 146*, pp. 106-114.

Andreouli, E. & Nicholson, C. (2018). Brexit and Everyday Politics: An Analysis of Focus-Group Data on the EU Referendum, *Political Psychology, 39(6)*, pp. 1323-1338.

Baiocchi, G. (2001). Participation, Activism, and Politics: The Porto Alegre Experiment and Deliberative Democratic Theory, *Politics & Society, 29(1)*, pp. 43-72.

Becken, S. (2007). Tourists' Perception of International Air Travel's Impact on the Global Climate and Potential Climate Change Policies, *Journal of Sustainable Tourism, 15(4)*, pp. 351-368.

Berg, B. L. & Lune, H. (2012) Qualitative Research Methods for the Social Sciences. 8th ed. Boston: Pearson

Beyea, S. C. & Nicoll, L. H. (2000). Collecting, Analyzing, and Interpreting Focus Group Data, *AORN Journal, 71(6)*, pp. 1278-1283.

Bryman, A. (2012) Social Research Methods. 4th ed. Oxford: Oxford University Press.

Department for Business, Energy & Industrial Strategy (BEIS). (2019). *2018 UK Greenhouse Gas Emissions, Provisional Figures. Statistical Release: National Statistics*. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/790626/2018-provisional-emissions-statistics-report.pdf [Accessed 26 April 2019].

Committee on Climate Change. (2018). *Reducing UK Emissions: 2018 Progress Report to Parliament.* Available at: https://www.theccc.org.uk/publication/reducing-uk-emissions-2018-progress-report-to-parliament/ [Accessed 02 January 2019].

Corner, A, Whitmarsh, L. & Xenias, D. (2012). Uncertainty, Scepticism and Attitudes Towards Climate Change: Biased Assimilation and Attitude Polarisation, *Climatic Change, 114(3-4)*, pp. 463-478.

De Groot, J. I. M. & Steg, L. (2009). Morality and Prosocial Behavior: The Role of Awareness, Responsibility, and Norms in the Norm Activation Model, *The Journal of Social Psychology, 149(4)*, pp. 425-449.

Dietz, T. & Stern, P. C. (2002). Exploring New Tools for Environmental Protection. In T. Dietz & P. C. Stern, (Eds.), *New Tools for Environmental Protection: Education, Information, and Voluntary Measures*, pp. 3-15. Washington, DC: National Academic Press.

Druckman, A, Hartfree, Y, Hirsch, D. & Perren, K. (2011). *Sustainable Income Standards: Towards a Greener Minimum?* Joseph Rowntree Foundation. Available at: https://www.jrf.org.uk/report/sustainable-income-standards-towards-greener-minimum [Accessed 18 October 2018].

Druckman, A. & Jackson, T. (2009). The Carbon Footprint of UK Households 1990-2004: A Socio-economically Disaggregated, Quasi-multi-regional Input-output Model, *Ecological Economics, 68(7)*, pp. 2066-2077.

Druckman, A. & Jackson, T. (2010a). An Exploration into the Carbon Footprint of UK Households. RESOLVE Working Paper 02-10. Available at: https://resolve.sustainablelifestyles.ac.uk/sites/default/files/RESOLVE_WP_02-10.pdf [Accessed 18 October 2018].

Druckman, A. & Jackson, T. (2010b). The Bare Necessities: How much Household Carbon do we Really Need?, *Ecological Economics, 69(9*), pp. 1794-1804.

The Environment, Food and Rural Affairs Committee (EFRA). (2017). *Food Waste in England*. Eighth Report of Session 2016-17. London: House of Commons. Available at: https://publications.parliament.uk/pa/cm201617/cmselect/cmenvfru/429/429.pdf [Accessed 02 January 2019].

Farstad, F, Carter, N. & Burns, C. (2018). What does Brexit Mean for the UK's Climate Change Act?, *The Political Quarterly, 89(2),* pp. 291-297.

Frick, J, Kaiser, F. G. & Wilson, M. (2004). Environmental Knowledge and Conservation Behavior: Exploring Prevalence and Structure in a Representative Sample, *Personality and Individual Differences, 37(8),* pp. 1597-1613.

Goldstein, N. J, Cialdini, R. B. & Griskevicius, V. (2008). A Room with a Viewpoint: Using Social Norms to Motivate Environmental Conservation in Hotels, *Journal of Consumer Research, 35(3),* pp. 472-482.

Gouldson, A, Lopez-Gunn, E, Van Alstine, J, Rees, Y, Davies, M. & Krishnarayan, V. (2008). New Alternative and Complementary Environmental Policy Instruments and the Implementation of the Water Framework Directive, *European Environment, 18(6),* pp. 359-370.

Gouran, D. S. & Hirokawa, R. Y. (1983). The Role of Communication in Decision-Making Groups: A Functional Perspective. In M. S. Mander, (Eds.), Communications in Transition: Issues and Debates in Current Research, pp. 168-185. New York: Praeger.

Green, R, Milner, J, Dangour, A. D, Haines, A, Chalabi, Z, Markandya, A, Spadaro, J. & Wilkinson, P. (2015). The Potential to Reduce Greenhouse Gas Emissions in the UK Through Healthy and Realistic Dietary Change, *Climatic Change, 129(1),* pp. 253-265.

Habermas, J. (1979). What is Universal Pragmatics? In T. McCarthy, (Trans.), *Communication and the Evolution of Society*, pp. 42-121. Boston: Beacon Press.

Harland, P, Staats, H. & Wilke, H. A. M. (2007). Situational and Personality Factors as Direct or Personal Norm Mediated Predictors of Pro-environmental Behavior: Questions Derived From Norm-activation Theory, *Basic and Applied Social Psychology, 29(4),* pp. 323-334.

Hepburn, C. & Teytelboym, A. (2017). Climate Change Policy After Brexit, *Oxford Review of Economic Policy, 33(1),* pp. 144-154.

Hurlstone, M. J, Lewandowsky, S, Newell, B. R. & Sewell, B. (2014). The Effect of Framing and Normative Messages in Building Support for Climate Policies, *PLoS ONE, 9(12),* pp. 1-19.

Intergovernmental Panel on Climate Change (IPCC). (2013). *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge University Press: Cambridge, UK and New York, NY. Available at: https://www.ipcc.ch/report/ar5/wg1/ [Accessed 15 April 2019].

IPCC. (2018). Summary for Policymakers. In: IPCC. (Eds.), *Global Warming of 1.5°C. An IPCC Special Report on the Impacts of Global Warming of 1.5°C above Pre-Industrial Levels and Related Global Greenhouse Gas Emission Pathways, in the Context of Strengthening the Global Response to the Threat of Climate Change, Sustainable Development, and Efforts to Eradicate Poverty*, pp. 3-26. World Meteorological Organization: Geneva, Switzerland. Available at: https://www.ipcc.ch/sr15/chapter/summary-for-policy-makers/ [Accessed 15 April 2019].

Jensen, B. B. (2002). Knowledge, Action and Pro-environmental Behaviour, *Environmental Education Research, 8(3)*, pp. 325-334.

Kelly, T. (2004). Unlocking the Iron Cage: Public Administration in the Deliberative Democratic Theory of Jürgen Habermas, *Administration & Society, 36(1)*, pp. 38-61.

Kollmuss, A. & Agyeman, J. (2002). Mind the Gap: Why do People Act Environmentally and what are the Barriers to Pro-environmental Behavior?, *Environmental Education Research, 8(3)*, pp. 239-260.

Kurz, T, Gardner, B, Verplanken, B. & Abraham, C. (2015). Habitual Behaviors or Patterns of Practice? Explaining and Changing Repetitive Climate-relevant Actions, *WIREs Climate Change, 6*, pp. 113-128.

Lehman, P. K. & Geller, E. S. (2004) Behavior Analysis and Environmental Protection: Accomplishments and Potential For More, *Behavior and Social Issues, 13(1)*, pp. 13-32.

Lewis, J. S. (2006). *The Function of Free Riders: Toward a Solution to the Problem of Collective Action*. Doctoral Thesis. Ohio, Bowling Green State University.

Lorenzoni, I, Nicholson-Cole, S. & Whitmarsh, L. (2007). Barriers Perceived to Engaging with Climate Change Among the UK Public and their Policy Implications, *Global Environmental Change, 17(3)*, pp. 445-459.

Malka, A, Krosnick, J. A. & Langer, G. (2009). The Association of Knowledge with Concern about Global Warming: Trusted Information Sources Shape Public Thinking, *Risk Analysis, 29(5)*, pp. 633-647.

Minx, J, Baiocchi, G, Wiedmann, T, Barrett, J, Creutzig, F, Feng, K, Förster, M, Pichler, P, Weisz, H. & Hubacek, K. (2013). Carbon Footprints of Cities and Other Human Settlements in the UK, *Environmental Research Letters, 8(3)*, pp. 1-10.

Moser, S. C. & Ekstrom, J. A. (2010). A Framework to Diagnose Barriers to Climate Change Adaptation, *PNAS, 107(51)*, pp. 22026-22031.

Nolan, J. M, Schultz, P. W, Cialdini, R. B, Goldstein, N. J. & Griskevicius, V. (2008). Normative Social Influence is Underdetected, *Personality and Social Psychology Bulletin, 34(7)*, pp. 913-923.

Owen, A. & West, C. (2015). WWF-UK Carbon Footprint Calculator Methodology. [Internal Document].

Owens, S. (2000). 'Engaging the Public': Information and Deliberation in Environmental Policy, *Environment and Planning A, 32(7)*, pp. 1141-1148.

Pichert, D. & Katsikopoulos, K. V. (2008). Green Defaults: Information Presentation and Pro-environmental Behaviour, *Journal of Environmental Psychology, 28(1)*, pp. 63-73.

Quimby, C. C. & Angelique, H. (2011). Identifying Barriers and Catalysts to Fostering Pro-Environmental Behavior: Opportunities and Challenges for Community Psychology, *American Journal of Community Psychology, 47(3-4)*, pp. 388-396.

Renewable Energy UK. (2019). Wash Most Clothes at 30 Degrees. Available at: http://www.reuk.co.uk/wordpress/energy-efficiency/wash-most-clothes-at-30-degrees/ [Accessed 19 October 2018].

Schultz, P. W. (2002). Knowledge, Information, and Household Recycling: Examining the Knowledge-Deficit Model of Behavior Change. In T. Dietz & P. C. Stern, (Eds.), *New Tools for Environmental Protection: Education, Information, and Voluntary Measures*, pp. 67-82. Washington, DC: National Academic Press.

Schwartz, S. H. (1977). Normative Influences on Altruism, *Advances in Experimental Social Psychology, 10*, pp. 221-279.

Sheppard, S. R. J. (2005). Landscape Visualisation and Climate Change: The Potential for Influencing Perceptions and Behaviour, *Environmental Science & Policy, 8(6)*, pp. 637-654.

Smith, A, Watkiss, P, Tweddle, G, Mckinnon, Prof. A, Browne, Prof. M, Hunt, A, Treleven, C, Nash, Prof. C. & Cross, S. (2005). *The Validity of Food Miles as an Indicator of Sustainable Development: Final Report Produced for DEFRA*. United Kingdom: AEA Technology Environment. Available at: http://library.uniteddiversity.coop/Food/DEFRA_Food_Miles_Report.pdf [Accessed 02 January 2019]

Steg, L. & Vlek, C. (2009). Encouraging Pro-environmental Behaviour: An Integrative Review and Research Agenda, *Journal of Environmental Psychology, 29(3)*, pp. 309-317.

Stern, P. C. (2000). Toward a Coherent Theory of Environmentally Significant Behavior, *Journal of Social Issues, 56(3)*, pp. 407-424.

Stoll-Kleeman, S, O'Riordan, T. & Jaeger, C. C. (2001). The Psychology of Denial Concerning Climate Mitigation Measures: Evidence From Swiss Focus Groups, *Global Environmental Change, 11(2)*, pp. 107-117.

Stretton Climate Care. (2019). Who We Are: Think Global, Act Local – A Community Action Group in it for the Long Haul. Available at: http://strettonclimatecare.org.uk/about-us/ [Accessed 01 November 2018].

Sustrans. (2008). *Carbon Savings from Active Travel Intervention. Sustrans Report to the Committee on Climate Change*. Sustrans: Bristol.

UK Energy Research Centre (UKERC). (2009). *What Policies are Effective at Reducing Carbon Emissions from Surface Passenger Transport? A Review of Interventions to Encourage Behavioural and Technological Change.* Available at: http://www.ukerc.ac.uk/publications/what-policies-are-effective-at-reducing-carbon-emissions-from-surface-passenger-transport.html [Accessed 02 January 2019].

Vatn, A. (2009). Cooperative Behavior and Institutions, *The Journal of Socio-Economics, 38(1)*, pp. 188-196.

Vatn, A. (2015) Environmental Governance: Institutions, Policies and Actions. Cheltenham: Edward Elgar.

Vicente-Molina, M. A, Fernández-Sáinz, A. & Izagirre-Olaizola, J. (2013). Environmental Knowledge and Other Variables Affecting Pro-environmental Behaviour: Comparison of University Students from Emerging and Advanced Countries, *Journal of Cleaner Production, 61*, pp. 130-138.

Waldeck, J. H, Shepard, C. A, Teitelbaum, C. A, Farrar, J. W. & Seibold, D. R. (2002). New Directions for Functional, Symbolic Convergence, Structuration, and Bona Fide Group Perspectives of Group Communication. In L. R. Frey (Eds.), *New Directions in Group Communication*, pp. 3-23. California, CA: Sage Publications.

Waste & Resources Action Programme (WRAP). (2009a). *Meeting the UK Climate Change Challenge: The Contribution of Resource Efficiency*. Available at: http://www.wrap.org.uk/content/meeting-uk-climate-change-challenge-0 [Accessed 9 October 2018].

WRAP. (2009b). *Household Food and Drink Waste in the UK*. Banbury: WRAP. Available at: http://www.wrap.org.uk/sites/files/wrap/Household_food_and_drink_waste_in_the_UK_-_report.pdf [Accessed 02 January 2019].

Whitmarsh, L. (2011). Scepticism and Uncertainty About Climate Change: Dimensions, Determinants, and Change Over Time, *Global Environmental Change, 21(2)*, pp. 690-700.

Wilbanks, T. J. & Stern, P. C. (2002). New Tools for Environmental Protection: What We Know and Need to Know. In T. Dietz & P. C. Stern, (Eds.), *New Tools for Environmental Protection: Education, Information, and Voluntary Measures*, pp. 337-348. Washington, DC: National Academic Press.

9 Appendices

9.1 Appendix A: The Focus Group Structure

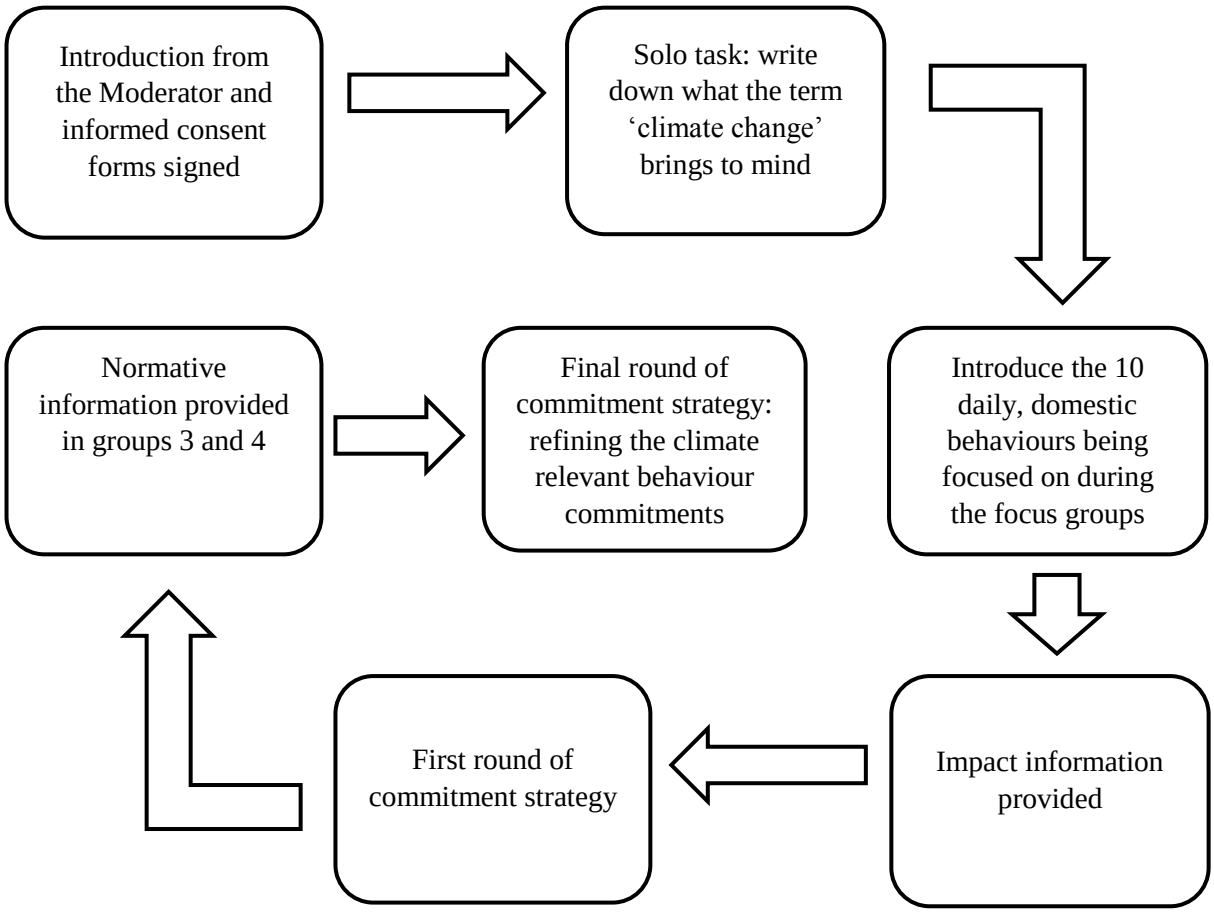


Figure 1: Structure of the January focus groups highlighting just the major elements from the groups. The arrows represent further discussion and questions asked during the focus groups

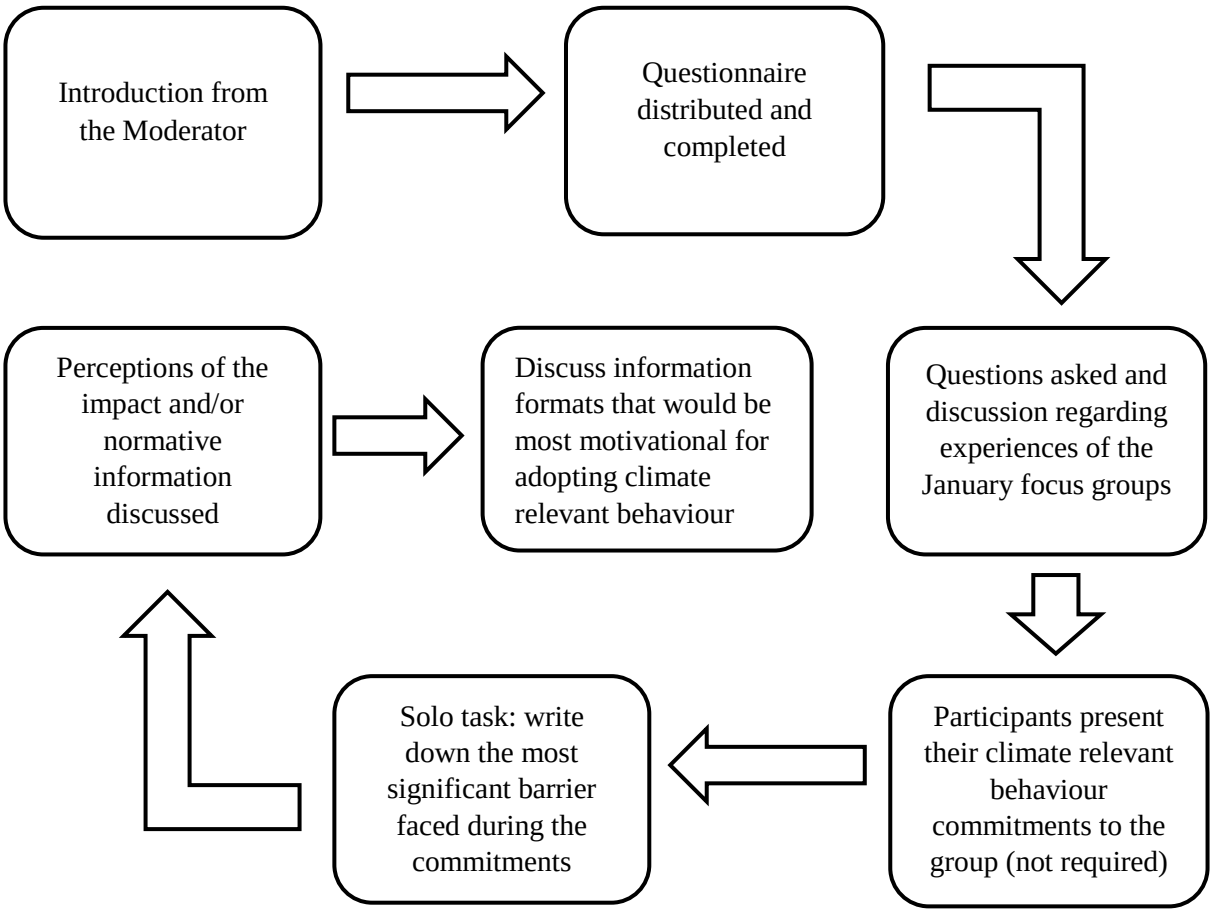


Figure 2: Structure of the February focus groups highlighting just the major elements from the groups. The arrows represent further discussion and questions asked during the focus groups

9.2 Appendix B: Impact Information

Table 1: The impact information hand-out provided to all participants during each January focus group. The impact information was collected from published literature in this field of study and relates to each of the 10 climate relevant behaviours focused on in the focus groups [sources included in the reference list].

Space Heating: Maintain separate temperature zones or turn down the thermostat
Space heating creates 15% of carbon dioxide (CO_2) emissions for an average UK household per year (Druckman & Jackson, 2009)
Turning the heating off in one unused room in your household results in an estimated 2% reduction in total household energy greenhouse gas emissions per year (Druckman, Hartfree, Hirsch, & Perren, 2011) and it is estimated that heating a home to less than 14^0C reduces energy use by 50% of the average UK home per year (Owen & West, 2015)

Lighting: Energy saving lightbulbs / turn off lights in unoccupied rooms
"Light is responsible for around 14% of 'household' emissions" per year (Druckman & Jackson, 2010a, p. 24)
Installing energy efficient lightbulbs results in an estimated 6% reduction in total household energy greenhouse gas emissions per year in the UK (Druckman et al., 2011)

Showering: Have shorter showers instead of baths
A three minute shower instead of a bath results in an estimated 5% reduction in total household energy greenhouse gas emissions per year in the UK (Druckman et al., 2011)

Washing Machine Use: Wash clothes at 30ºC rather than 40ºC
The estimated "proportion of direct carbon emissions in electricity used for clothes care" per year; washing machine, 42%, and tumble dryer, 36% (Druckman & Jackson, 2010a, p. 23)
It is estimated that washing clothes at 30^0C rather than 40^0C can reduce energy consumption in UK homes by 40% per year (Renewable Energy UK, 2019)

Meat Consumption: Reduce red meat
Greenhouse gas emissions from meat purchased by UK households per year are estimated at 0.75 tonnes of CO_2 equivalent per capita (Waste & Resources Action Programme (WRAP), 2009a)
"The UK diet is relatively high in animal source foods, which have been estimated to account for over 50% of UK food-related emissions" per year (Green et al., 2015, p. 254)

Shopping Habits: Shop from local sellers/producers (UK field grown)
Food transport was estimated to produce 10 million tonnes of carbon dioxide emissions in the UK for one year, which equalled 1.8% of the UK carbon dioxide emissions for that year (Smith et al., 2005)

Food Waste: Buy less food thus reduce food waste
22% of food and drink is wasted per year in the UK resulting in total greenhouse gas emissions "equivalent to approximately 20 million tonnes of carbon dioxide per year" (WRAP, 2009b, p. 6)
In 2016 there was a rise in biodegradable waste sent to landfill which was "largely due to a 9% increase in municipal solid waste sent to landfill" (Committee on Climate Change, 2018, p. 213)

Composting: Compost organic waste

In the UK, "it is estimated that 3,415,000 tonnes of waste are disposed of in the food sector each year. Sending this quantity of food waste to anaerobic digestion (composting) would abate 3.86 million tonnes CO_2 equivalent per year" (Environment, Food and Rural Affairs Committee (EFRA), 2017, p.27)

Personal Vehicle Use: Walking, cycling, car sharing

66% of annual UK travel greenhouse gas emissions are "dominated by emissions associated with running and owning personal vehicles" (Druckman & Jackson, 2010a, p. 14)

A UK shift towards a "50% increase in mode share of walking and a tenfold increase in mode share of cycling could deliver a saving of nearly 2 million tonnes of carbon per annum" (Sustrans 2008 as cited in UK Energy Research Centre (UKERC), 2009, p. 23)

Public Transport: Use public transport for shorter journeys, eg; shopping

Public transport services are responsible for only 14% of transport emissions per year (Druckman & Jackson, 2010a)

Greenhouse gas emissions from public transport (excluding aviation) are estimated to comprise "less than 4% of the entire carbon footprint" of the UK per year (Druckman & Jackson, 2010a, p. 16)

9.3 Appendix C: The Questionnaire

Table 2: The questionnaire completed by participants in the follow-up focus groups. Participants from groups 3 and 4 completed this version of the questionnaire. Participants from groups 1 and 2 completed the same questionnaire with questions 12 and 13 removed.

1) Participant number :

2) What climate relevant behaviour commitment(s) did you make during the January focus group? If you made more than one commitment please specify all of the climate relevant behaviour commitments that you made in the table below.

Climate relevant behaviour commitment	Any specifics you would like to add regarding your climate relevant behaviour commitment (not required)
1)	
2)	
3)	
4)	
5)	

3) Did you attempt to commit to any additional climate relevant behaviours that you did not specify when writing down your commitments during the January focus group? Please specify in the space below. Please refer to the behaviours that you have included in your answers for question 2 and question 3 when answering all of the following questions.

4) Why did you choose to commit to this/these climate relevant behaviour(s) over other climate relevant behaviours discussed during the January focus group? Please specify in the space below.

5) How long were you able to adopt the climate relevant behaviour(s) that you committed to? Please fill in the table for each climate relevant behaviour commitment that you made.

Climate relevant behaviour commitment	Length of time that you adopted the climate relevant behaviour(s)				
	<1 week	1-2 weeks	2-3 weeks	3-4 Weeks	Continued to commit to the climate relevant behaviour(s) from the January focus group date to the February focus group date (4 weeks)
1)	☐	☐	☐	☐	☐
2)	☐	☐	☐	☐	☐
3)	☐	☐	☐	☐	☐
4)	☐	☐	☐	☐	☐
5)	☐	☐	☐	☐	☐

6) During your climate relevant behaviour commitment(s), did you face any technical and/or economic constraints? (Technical constraints examples could include; different heating systems, poor transport opportunities, no shops selling local produce in your area etc). Please fill in the table for each climate relevant behaviour commitment that you made.

Climate relevant behaviour commitment	Technical and/or economic constraints
1)	
2)	
3)	
4)	
5)	

7) During your climate relevant behaviour commitment(s), did you face any social challenges or barriers? (Social barrier examples could include; barriers related to expectations from family and friends, household habits etc). Please fill in the table for each climate relevant behaviour commitment that you made.

Climate relevant behaviour commitment	Social challenges or barriers
1)	
2)	
3)	
4)	
5)	

8) During your climate relevant behaviour commitment(s), did you face any further challenges? (Further challenges could include; individual preferences such as not enjoying meals without red meat). Please specify in the space below.

9) What encouraged you to attempt to adopt climate relevant behaviour(s)? Please fill in the table by ticking the boxes that are most appropriate for each climate relevant behaviour commitment that you made.

Climate relevant behaviour commitment	Motivation to adopt climate relevant behaviour(s)					
	Information provided during the January focus group	Hearing perspectives on the subject from others during the January focus group	Learning more about climate change during the January focus group	Information from outside of the January focus group	Pressure to adopt climate relevant behaviours felt from the focus group process	Other (Please specify in the space below):
1)	☐	☐	☐	☐	☐	☐
2)	☐	☐	☐	☐	☐	☐
3)	☐	☐	☐	☐	☐	☐
4)	☐	☐	☐	☐	☐	☐
5)	☐	☐	☐	☐	☐	☐

10) Did the technical, emissions information provided during the January focus group encourage you to attempt to carry out the climate relevant behaviour commitment(s) that you made? Please tick the appropriate box to indicate your answer.

☐ a) Yes

☐ b) No (Skip to question 12)

11) If you answered yes to question 10, why did the technical, emissions information encourage you to attempt to carry out the climate relevant behaviour commitment(s) that you made? Please specify in the space below.

12) Did the information provided by the member of Stretton Climate Care encourage you to attempt to carry out the climate relevant behaviour commitment(s) that you made? Please tick the appropriate box to indicate your answer.

☐ a) Yes

☐ b) No (Skip to question 14)

13) If you answered yes to question 12, why did the information provided by the member of Stretton Climate Care encourage you to attempt to carry out the climate relevant behaviour commitment(s) that you made? Please specify in the space below.

14) On a scale of 1-5 (1 being not challenging and 5 being extremely challenging), how challenging did you find the process of adopting climate relevant behaviour(s)? Please fill in the table by ticking the box that is most appropriate for each climate relevant behaviour commitment that you made.

Climate relevant behaviour commitment	How challenging did you find the process of adopting climate relevant behaviour(s)? (1 = not challenging, 5 = extremely challenging)				
	1	2	3	4	5
1)	☐	☐	☐	☐	☐
2)	☐	☐	☐	☐	☐
3)	☐	☐	☐	☐	☐
4)	☐	☐	☐	☐	☐
5)	☐	☐	☐	☐	☐

15) When adopting climate relevant behaviour(s), did this influence any of your family members or other household members to change their behaviours? In addition, did any of your family members or other household members influence your climate relevant behaviour commitment(s)? Please specify in the space below.

16) Has the information provided during the focus group and this focus group process encouraged you to continue adopting climate relevant behaviour(s) in your everyday life? Please tick the appropriate box to indicate your answer.

- ☐ a) Yes
- ☐ b) No
- ☐ c) Need more information to encourage me

17) Is there any further information that would motivate you to adopt climate relevant behaviour? Please specify what the further information would be in the space below.

9.4 Appendix D: Further Barrier Results

Table 3: Further social, economic, technical, and most significant barriers faced by participants when attempting to participate in climate relevant behaviour

Group	Participant Number	Social Barriers Faced	Economic Barriers Faced	Technical Barriers Faced	Most Significant Barrier Faced
Group 1	1	Family members not eating requested food before it goes rotten	None	Sometimes had to do an additional shop using the car as did not buy enough food	Husband (family)
	2	None	None	None	Memory
	3	Reminding children to turn the lights and TV off	None	None	Children and planning
	4	None	None	Lack of available time, short best before dates on fresh food creates waste	Time
	5	None	None	Poor transport in local area	Did not answer
	6	None	None	None	None
	7	None	None	Buying soil in a small amount is difficult, food is provided at place of residence and the quantity available for pescatarians is poor, no gluten free pescatarian meals at restaurants	Wrong pot size, buying soil in a small amount is difficult, and memory
	8	When friends are showering in the place of residence with loud music it encourages long showers	none	Could not resist having a bath, still overestimated the food that was needed when shopping which created food waste	Did not answer
Group 2	9	Family complained that heating was not as warm as usual	None	Food best before dates need to be longer to reduce waste	Family
	10	Family habits are difficult to change as children seem to have a more flippant attitude	None	Prefer to take baths instead of showers	Family
	11	Children leave lights on around the house	None	None	None
	12	Wife objected strongly	None	None	None
	13	None	None	Washing at 30°C equates to a slower spin resulting in having to do an additional spin	Did not answer

Table 3: Further social, economic, technical, and most significant barriers faced by participants when attempting to participate in climate relevant behaviour (continued.)

Group	Participant Number	Social Barriers Faced	Economic Barriers Faced	Technical Barriers Faced	Most Significant Barrier Faced
Group 3	14	None	None	Would have composted organic waste but my property of residence is rented so I cannot	Did not answer
	15	Objection from partner regarding the compost bin being unhygienic.	Have to pay for a compost bin as the council do not provide one	Difficult to wash hair in three minutes, have to make sure the compost bin is out of reach of the dog	Difficult to wash hair in three minutes
	16	None	Local shops very expensive and shopped everyday	Having to be more planned and organised	Did not answer
	17	None	None	None	None
	18	Have responsibilities to take family members to college so organising public transport use was difficult	None	Sometimes the clothes did not feel as clean as usual, public transport is poor in rural areas so needed to be more organised, do not have a shower at home so had to shower at the gym	Planning
	19	Did eat meat when invited out for meals as felt awkward not to	None	Difficult to find produce grown in the UK	None
Group 4	20	Reducing meat affected by having to provide meals for other family members in the household	None	None	Family
	21	Had to provide meat based meals for family members	Hard not to be tempted by food bargains at supermarkets	None	Not being tempted to buy food bargains
	22	None	None	Eating less meat increases the temptation to buy more	Memory, and being hungry
	23	None	Being more creative with recipes meant having to buy extra ingredients	Some unexpected trips away created food waste, some days I was too tired to be creative with recipes to use up food already in the kitchen	Laziness
	24	Children reluctant to spend only three minutes in the shower	Cost of LED lightbulbs	None	Cost of LED lightbulbs
	25	Have to use the car often to take grandchildren to sports activities as well as for visiting relatives	None	Lack of local shops selling the produce that I needed, poor public transport in the area	Did not answer

9.5 Appendix E: Further Information Disclosure Results

Table 4: The number of participants that perceived the impact and/or normative information as motivating for adopting climate relevant behaviours

Group	Did the Impact Information Encourage Participants to Adopt Climate Relevant Behaviours (Number of Participants)			Did the Normative Information Encourage Participants to Adopt Climate Relevant Behaviours (Number of Participants)		
	Yes	No	Did not answer	Yes	No	Did not answer
1	3	5	0			
2	0	5	0			
3	5	1	0	4	1	1
4	4	2	0	3	3	0

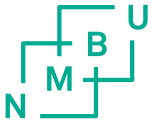
Table 5: Information formats that participant's peceived as being the most motivational for adopting climate relevant behaviours

Group	Information Format
1	Visual information, cost expenditure information, impact information, information providing examples of how to change behaviours, continuous information
2	Cost expenditure information, information highlighting that the rest of the world are doing the same
3	Impact information, emailed information depicting links that direct you to continuously updated websites that help and inform, information provided by a government scheme which is filtered into all parts of society (similar to the healthy eating Change for Life campaign), information given through social media, information combining consequences of actions and personal benefits from changing behaviours, information that shocks
4	Cost expenditure information, relatable information, easy and accessible information, information specific to personal needs (eg. how one could save money or become healthier)

9.6 Appendix F: Reasons for Commitments

Table 6: The reasons that participants from each group chose to commit to climate relevant behaviour

Group	Reasons for Choosing to Commit to Climate Relevant Behaviour
1	Financial reasons, it was the behaviour that needed the most improvement, achievable, climate benefit as well as a personal benefit, the importance of tackling climate change for those low-lying regions of the world, necessary to do with little effort, able to live happily without meat, easy commitments, encouraged by other participants who had already made this change, needed to change this behaviour the most
2	Most relevant, easy to engage with, financial savings, already committed to most of the other behaviours, seemed likely to be accepted by family, the behaviour that needed the most improvement
3	A part of the daily routine so an attempt to change daily habits, wanted to make this commitment for a long time, it was the behaviour that needed the most improvement, already committed to the behaviour before so wanted to continue it, simple and easy behaviour to adjust to, the change would be the most beneficial for the climate, quick and easy fix, achievable, really concerned about the carbon footprint of this daily behaviour
4	Already committed to most of the other behaviours, achievable, not too difficult, the behaviours were in line with other personal challenges such as weight loss, something I already did but didn't pay much attention to so provided the opportunity to focus on this behaviour, something already on my mind, the most achievable, least painful to achieve, realistic, because you can easily adapt the behaviours into daily lifestyles



Norges miljø- og biovitenskapelige universitet
Noregs miljø- og biovitskapelege universitet
Norwegian University of Life Sciences

Postboks 5003
NO-1432 Ås
Norway