Creature comforts: an exploration of comfort in the home

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Creature Comforts:
An Exploration of Comfort in the Home

By
Andrea Burris

Submitted in partial fulfilment of the requirements
For the award of
Doctorate of philosophy of Loughborough University

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Abstract

In response to climate change, there is a growing need for the UK to reduce carbon emissions in the domestic sector. As a majority of energy consumed within the domestic sector is as a result of space and water heating, research in the field focuses on thermal comfort. The literature on thermal comfort is dominated by an examination of the physiological aspects, and although the influences of psychological and socio-cultural aspects are often recognised, their relationship to the physiological aspects is not fully understood. Additionally, the literature typically studies various elements of comfort (e.g. thermal, acoustic, lighting, etc.) in isolation to each other rather than taking a holistic approach which would mirror how they are experienced in the real world and identify potential associations.

As a result, this thesis explores the multi-dimensions of comfort in the domestic environment. This research begins by taking a user-centred approach to exploring UK householders’ perspectives of comfort in the home. Through interviewing householders, the findings revealed householders attributed a wide scope of factors to their own experience of comfort, from aesthetics to feeling secure in their home; the findings highlighted the significance of psychological factors to householders comfort. The following stage involved a focused and in-depth exploration of the psychological dimensions of domestic comfort through photo elicitation interviews. The findings supported the presence of four intertwined psychological dimensions and further established the multidimensional nature of comfort. The final study was conducted to establish when comfort and unwinding takes place in householders’ everyday lives. Through the use of two self-reporting ethnographic tools, namely SenseCams and diaries, householders were observed in their homes. The findings captured householders engaging in various comfort making activities and also demonstrated the value of using self-reporting tools in the home context. In the final stage, a classification of domestic comfort was generated which presents an accumulation of the findings from this research to produce a holistic and multi-dimensional notion of domestic comfort.
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# Table of Contents

Abstract............................................................................................................................................. i
Acknowledgements........................................................................................................................... ii

1 Introduction...................................................................................................................................... 1
  1.1 The Big Picture: Greenhouse Gases, Global Warming and Climate Change ..................... 1
  1.2 Efficiency, Conservation and Behaviour Change ............................................................... 2
  1.3 Energy and Comfort by Disciplines.................................................................................... 4
  1.4 The Changing Concept of Comfort..................................................................................... 5
  1.5 A Need for a User-Centred Approach to Domestic Comfort ........................................... 6
  1.6 Aims of the Research.............................................................................................................. 6
  1.7 Thesis Structure..................................................................................................................... 7

2 Literature Review............................................................................................................................. 12
  2.1 Introduction ............................................................................................................................ 12
  2.2 Defining Comfort .................................................................................................................. 12
    2.2.1 Dimensions of Comfort................................................................................................. 14
    2.2.2 Thermal Comfort........................................................................................................... 17
    2.2.3 Comfort and Human Needs......................................................................................... 23
  2.3 Domestic Comfort .................................................................................................................. 27
    2.3.1 The Meaning of Home................................................................................................. 27
    2.3.2 Heijs and Stringer’s: Properties of a Dwelling ......................................................... 30
  2.4 Energy Use and Domestic Comfort by Disciplines.............................................................. 34
    2.4.1 Engineering and Technology....................................................................................... 34
    2.4.2 Economics...................................................................................................................... 35
    2.4.3 Sociology....................................................................................................................... 36
    2.4.4 Psychology..................................................................................................................... 38
  2.5 Conclusions.............................................................................................................................. 39

3 Research Paradigm......................................................................................................................... 42
  3.1 Philosophical Stance ............................................................................................................... 42
  3.2 Theoretical Perspectives......................................................................................................... 45
    3.2.1 Ethnography................................................................................................................ 45
    3.2.2 Phenomenology............................................................................................................ 46
    3.2.3 Theoretical Approach.................................................................................................. 48
  3.3 Methodological Approach....................................................................................................... 48
    3.3.1 Interpretive Phenomenology Approach....................................................................... 49
<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.12.2</td>
<td>The Meaning of Comfort</td>
<td>88</td>
</tr>
<tr>
<td>5.12.3</td>
<td>Creating Comfort</td>
<td>97</td>
</tr>
<tr>
<td>5.13</td>
<td>Discussion</td>
<td>109</td>
</tr>
<tr>
<td>5.13.1</td>
<td>The Environment and Physical Comfort</td>
<td>110</td>
</tr>
<tr>
<td>5.13.2</td>
<td>Aesthetics and Perceptions of Space and Order</td>
<td>113</td>
</tr>
<tr>
<td>5.13.3</td>
<td>Psychological Wellbeing</td>
<td>114</td>
</tr>
<tr>
<td>5.13.4</td>
<td>Interactions and Activities</td>
<td>115</td>
</tr>
<tr>
<td>5.13.5</td>
<td>Reflections</td>
<td>115</td>
</tr>
<tr>
<td>5.14</td>
<td>Conclusions</td>
<td>117</td>
</tr>
<tr>
<td>6</td>
<td>Household Profiles</td>
<td>120</td>
</tr>
<tr>
<td>7</td>
<td>Insights into Comfort and Daily Routines</td>
<td>126</td>
</tr>
<tr>
<td>7.1</td>
<td>Introduction</td>
<td>126</td>
</tr>
<tr>
<td>7.2</td>
<td>Study Aims</td>
<td>127</td>
</tr>
<tr>
<td>7.3</td>
<td>Study Rationale</td>
<td>127</td>
</tr>
<tr>
<td>7.4</td>
<td>Methods</td>
<td>127</td>
</tr>
<tr>
<td>7.5</td>
<td>Sampling</td>
<td>129</td>
</tr>
<tr>
<td>7.6</td>
<td>Piloting</td>
<td>130</td>
</tr>
<tr>
<td>7.7</td>
<td>Design and Procedure of the Focus Groups</td>
<td>130</td>
</tr>
<tr>
<td>7.8</td>
<td>Ethics</td>
<td>131</td>
</tr>
<tr>
<td>7.9</td>
<td>Equipment</td>
<td>131</td>
</tr>
<tr>
<td>7.10</td>
<td>Data Analysis</td>
<td>132</td>
</tr>
<tr>
<td>7.10.1</td>
<td>NEP Scale</td>
<td>132</td>
</tr>
<tr>
<td>7.11</td>
<td>Findings</td>
<td>132</td>
</tr>
<tr>
<td>7.11.1</td>
<td>Background Information</td>
<td>132</td>
</tr>
<tr>
<td>7.11.2</td>
<td>Household Information</td>
<td>133</td>
</tr>
<tr>
<td>7.11.3</td>
<td>NEP Scale</td>
<td>134</td>
</tr>
<tr>
<td>7.11.4</td>
<td>Findings</td>
<td>135</td>
</tr>
<tr>
<td>7.12</td>
<td>Discussion</td>
<td>142</td>
</tr>
<tr>
<td>7.12.1.1</td>
<td>Reflections</td>
<td>143</td>
</tr>
<tr>
<td>8</td>
<td>Exploring Psychological Dimensions of Comfort in the Home</td>
<td>146</td>
</tr>
<tr>
<td>8.1</td>
<td>Introduction</td>
<td>146</td>
</tr>
<tr>
<td>8.2</td>
<td>Study Aims</td>
<td>146</td>
</tr>
<tr>
<td>8.3</td>
<td>Study Rationale</td>
<td>147</td>
</tr>
<tr>
<td>8.4</td>
<td>Methods</td>
<td>148</td>
</tr>
</tbody>
</table>
11.2.1 The identification of wide scope of dimensions attributed to domestic comfort 263
11.2.2 An exploration of the psychological dimensions of comfort 263
11.2.3 Generating a classification of domestic comfort 263
11.2.4 Research Publications 263
11.3 Limitations to Research 264
11.3.1 Time and Resources 264
11.4 Future Work 264
11.4.1 Identifying Negotiable Factors of Comfort 265
11.4.2 Working Tool 265
12 References 267
13 Appendices 280
APPENDIX A 281
APPENDIX B 285
APPENDIX C 287
APPENDIX D 289
APPENDIX E 293
APPENDIX F 295
APPENDIX G 331

List of Figures

Figure 1: Outline of Thesis 10
Figure 2: Thermal Comfort Model from Fanger (ISSO74) 20
Figure 3: Psycho-Physiological Model of Thermal Comfort from Auliciems (1981) 22
Figure 4: Maslow's Hierarchy of Needs (1970) 24
Figure 5 - Research Paradigm 55
Figure 6 - Research Paradigm 61
Figure 7: Vicon Revue Camera (Microsoft Research) 68
Figure 8: Excerpt of coding from NVivo 86
Figure 9: Meaning of Comfort Data Map 90
Figure 10: Creation of Comfort Data Map 99
Figure 11: Different Data Collection Techniques and Knowledge (Visser et al. 2005) 128
Figure 12: Participant NEP Scores 135
Figure 13: Pauline Day-In-The-Life Exercise 140
Figure 14: Kevin Day-In-The-Life Exercise 140
Figure 60: Rachael’s Garden, Maria’s Living Room, Olivia’s Living Room, Walter’s Kitchen ........................................................................................................................................ 219
Figure 61: Vicon Revue Desktop Software Screenshot ........................................................................................................................................ 220
Figure 62: Sequence 1-6, Kevin, Eating Dinner ........................................................................................................................................ 221
Figure 63: Kevin, Diary Day 3 ........................................................................................................................................ 221
Figure 64: Lewis Using Phone, Walter Using a Remote Control ........................................................................................................................................ 222
Figure 65: Eva, Diary Day 1 ........................................................................................................................................ 222
Figure 66: Sequence 1-6, Walter Multitasking ........................................................................................................................................ 223
Figure 67: Walter, Diary Day 1 ........................................................................................................................................ 223
Figure 68: Kevin, Listening to Music ........................................................................................................................................ 224
Figure 69: Maria, Adjusting the Thermostat on the Heater ........................................................................................................................................ 225
Figure 70: Rachael, Lying on the Sofa and Maria Curled up on the Sofa ........................................................................................................................................ 226
Figure 71: Rachael, Diary Day 3 ........................................................................................................................................ 226
Figure 72: Jessica, Unwinding ........................................................................................................................................ 227
Figure 73: Rachael, Diary Day 2 ........................................................................................................................................ 227
Figure 74: Mike, Shared Viewing ........................................................................................................................................ 228
Figure 75: Jessica, Olivia and Rachael Using Smart Phones ........................................................................................................................................ 229
Figure 76: Pauline, Diary Day 2 ........................................................................................................................................ 230
Figure 77: Sade, Diary Day 2 ........................................................................................................................................ 230
Figure 78: Classification of Comfort ........................................................................................................................................ 240

List of Tables

Table 1: Bedford Comfort Scale and ASHRAE Scale .................................................................................................................. 19
Table 2: Immersive Focus Group Tools ........................................................................................................................................ 65
Table 3: Summary of Advantages and Disadvantages of Wearable Cameras as Observational Tools ........................................................................................................................................ 72
Table 4: Summary of the Advantages and Disadvantages of Self-Reporting Diaries ........................................................................................................................................ 73
Table 5: Guide to Conducting a Thematic Analysis .................................................................................................................. 75
Table 6: Conducting a Template Analysis ........................................................................................................................................ 76
Table 7: Study 1 Participant Information ........................................................................................................................................ 87
Table 8: Focus Group Process ........................................................................................................................................ 131
Table 9: Study 2 Participant Information ........................................................................................................................................ 133
Table 10: Participants Comfort Activity Summaries ........................................................................................................................................ 141
Table 11: Guidance for Photo Elicitation Method ........................................................................................................................................ 150
Table 12: Study 4 Initial Coding Template ........................................................................................................................................ 154
Table 13: Participant Information for Study 3 ........................................................................................................................................ 156
Table 14: Number of Participants Working at Home ........................................................................................................................................ 208
Table 15: Participant Information ........................................................................................................................................ 209
Chapter 1: Introduction

Chapter 2: Literature Review

Chapter 3: Research Paradigm

Chapter 4: Methodology

Chapter 5: Exploring Householders’ Perspective of Comfort in the Home

Chapter 6: Household Profiles

Chapter 7: Insights into Comfort and Daily Routines

Chapter 8: Exploring Psychological Dimensions of Comfort in the Home

Chapter 9: Capturing Comfort in Context

Chapter 10: Discussion: A Classification of Domestic Comfort

Chapter 11: Conclusions and Future Work

Chapter 12: References

Chapter 13: Appendices
1 Introduction

1.1 The Big Picture: Greenhouse Gases, Global Warming and Climate Change

Climate change is a recognised global issue caused by the build-up of greenhouse gases (predominantly carbon dioxide) trapping heat near the Earth’s surface causing the planet to gradually get warmer. In 1992, the United Nations Framework Conventions for Climate Change (UNFCCC) developed the Kyoto Protocol, a binding agreement that sets out carbon emission limitations and commitments for (as of March 2014) 192 countries across the world, including the UK showing the growing acknowledgement of the issue of climate change (UNFCCC n.d.). The UK government passed the Climate Change Act in 2008 which puts into place targets to cut carbon emissions by 80% by 2050 against a 1990 baseline; the government is expecting to make a majority of cuts to UK carbon emissions before 2020. A number of policies and schemes are now in place to encourage more energy efficient measures across the transport, industry, services and domestic sectors (Palmer et al. 2012). This research is specifically focused on the impact of climate change on the domestic sector.

The domestic sector is responsible for over a quarter of the overall energy consumed in the UK, for this reason domestic energy consumption is a major focus for introducing energy efficiency measures. Although climate change is slowly warming the Earth much of the required initiatives to cut carbon emissions in the domestic sector concentrate on the issue of space heating. Statistics released by the Department of Energy and Climate Change (DECC) indicate that over 60% of energy consumed in the home is through space heating, and this has remained the dominant use of energy since 1970 (Palmer et al. 2012). The housing stock in England is one of the oldest in Europe, 8.8 million dwellings were built before 1945 and more than half of these were built pre-1919, consequently there is a significant number of dwellings which are not particularly energy efficient, losing heat energy through poor insulation or inefficient heating systems (DCLG 2009). With this in
mind, the government is eager for occupants to carry out energy efficiency home improvements, and therefore preserve the older housing stock (DECC 2012). The government are also introducing energy conservation measures on a national scale to encourage behaviour change towards reduced consumption.

1.2 Efficiency, Conservation and Behaviour Change

The government have introduced a number of initiatives in recent years to encourage retrofitting, the most recent scheme is the Green Deal, designed to help improve the efficiencies of homes by providing householders with a loan for improvements such as cavity insulation, installing a new condensing boiler, or renewable energy technologies such as solar panels (DECC n.d.). DECC (2012) have estimated that energy efficient heating systems and wall and loft insulation has saved more than 40 million tonnes of oil equivalent. Efficiency measures like the aforementioned allow occupants to maintain comfort levels without necessarily adapting their behaviour in any way. Though research has shown that occupant behaviour towards space heating has changed over the past forty years, in winter, homes are now on average running 4.9°C higher than they were in 1970 at 16.9°C; this does not inversely mirror external temperature which have only decreased by 1.5°C from 5.8°C to 4.3°C in 2010 (Palmer et al. 2012). Parallels can be drawn with the principles behind the practice of adaptive thermal comfort, which recognises that people have different expectations for indoor temperatures depending on external weather conditions. Most research to date in this area has been conducted in relation to non-residential buildings where standards have restricted indoor temperatures to lie within narrow margins irrespective of external weather conditions, although research has shown occupants actually desire varied indoor temperatures, that being, warmer in the winter and cooler in the summer (Auliciems 1981; Nicol & Humphreys 2002; Nicol & Stevenson 2013). Occupants adapt as a result of their thermal environment, these adoptions normally fall into three categories behavioural adjustments such as removing or putting on clothes, physiological adaption such as acclimatization and psychological adaption based on past thermal experiences and expectations for present environment. The
research into adaptive thermal comfort is vital in the context of climate change and could potentially offer new approaches to occupant comfort in the home. The rise in internal temperatures seen in dwellings during winter could be as a result of the energy efficiency rebound or take-back effect. The roots of this phenomenon lie in behavioural economics; research has indicated that the installation of energy efficient technologies can increase energy use as occupants offset the savings by increasing their consumption. In terms of space heating research has shown that the rebound can be between 10-30% of the efficiency savings therefore the energy efficiency measure is between 70-90% effective. It has also been found where the rebound effect has occurred as a result of space heating there has also been an increase in the thermal comfort of occupants (Greening et al. 2000). Although there is sufficient evidence that the rebound effect does exist, why it occurs is still largely unexplained, most research to date has been conducted by consumer psychologists across disciplines of economy and psychology, with their focus mainly on purchase-related behaviours and estimating the size of the rebound as opposed to further understanding of householders behavioural response to energy efficiency technologies.

The occurrence of energy conservation actions in the home requires some form of behaviour change on the part of the householder. Another major government initiative is to provide all UK homes with smart meters in the next ten years. Smart meters are a socio-technical feedback intervention, the government believe by providing householders with real-time direct feedback, they will gain a greater understanding of their energy use and greater control over how energy is used in their home. It is hoped smart meters will reduce peak energy demand and encourage users to carry out high energy activities at off-peak times (i.e. using the washing machine between midnight and 7am). It is expected that smart meters will have a low-impact on energy savings; estimations presented by Darby (2010) from an accumulation of the literature report that smart meters will save householders, on average, only 5-15%. The success of this relies heavily on householder’s engagement with the interface and the attitudes towards financial savings and/or conserving energy, which all drives into their willingness to change their behaviour.
The effectiveness of smart meters in energy conservation on a long-term basis is yet unknown as research is still in the early stages, yet it is clear that in order to achieve behaviour change on a national scale, the government cannot afford to be purely device-orientated; they must understand the socio-psychological aspects of behaviour towards energy technologies (Boardman 2004; COI 2009; Darby 2006; Lutzenhiser 1992).

1.3 Energy and Comfort by Disciplines

The main body of literature on people and energy in the home falls into four main categories: engineering, economics, psychology and sociology; they all make their own contributions to knowledge usually recognising that it is only a fragment of the bigger picture. The following gives a brief overview of each discipline’s focus in terms of energy use. Engineering and technical disciplines tend to focus on the installation of energy efficient technologies (e.g. cavity walls), they focus on the physiological comfort of the occupant through quantitative measures, with the broad assumption that the human will engage with energy technologies as they were designed. The economists’ research provides price signals, information of energy consumption and purchase-related energy efficient devices (e.g. energy efficient washing machines) (de Haan et al. 2006). Although the actions of the human are not the focus of their research the human is the consumer and is considered to be rational in behaviour and with the choices he or she makes in regards to energy efficient purchases and/or consumption. The psychological literature offers an insight into householders’ behaviour and in more recent years behaviour change towards actions which conserve energy. The psychological perspective on energy follows the often ABC model for behaviour change. The ABC model refers to the (A) attitudes people have towards energy consumption which leads inevitably to their (B) behaviour and their (C) choices whether to carry out energy conserving activities (Shove 2010). The sociological literature focuses on the role energy plays in our society; arguing that the individual behaviour is as a result of our intensive energy consuming society, driven to this state by cultural influences and social norms (Shove 2003b).
Most research in the area of people and energy use has followed a “divide-and-control” approach (Moezzi & Lutzenhiser 2010, p.210) where disciplines follow their own agenda to solving the many issues of energy consumption; whilst inadvertently forming barriers to understanding the whole picture. This seems particularly critical in the approach towards the issue of thermal heating in UK homes. The technical school of thought estimates the savings in carbon emissions but may fail to account for the unpredictable behaviour of the householders; while the psychologists may recognise their consumptive behaviour as being comfort driven, they may miss the cultural and societal drivers of householder’s behaviours.

1.4 The Changing Concept of Comfort

With space heating being responsible for the largest portion of energy consumption in the home, it is clear that thermal comfort is key in the implementation of energy reductive measures. Consequently the literature focuses heavily on the contributions from technical disciplines to thermal comfort, often drawing from the standards used in commercial buildings (a macro-level systems of control); however these do not necessarily translate to thermal comfort in the domestic environment which householders control (a micro-level system) (Pierce et al. 2010). Cole et al. (2008) argues for the need to ‘re-contextualise the notion of comfort’ within the climate change debate, he draws upon the roles of psychology and sociology in adding further dimensions to the concept of comfort in technical research. Contributions to this debate from Elizabeth Shove, a sociologist, have been paramount; she describes comfort “as a dynamic enterprise, the achievement of comfort is here understood as a creative process of trading, juggling & manipulation, whether of clothes, activity and daily routine or of building technologies.” (Shove 2003b, p.37). Shove’s definition moves away from the traditional passive ideals of comfort and highlights its multifaceted nature which this research aims to explore further. With the focus on thermal comfort the other aspects of comfort, for instance, acoustic or postural comfort are not considered in the climate change debate as their contribution to energy consumption are undetermined. The research acknowledges the need for a more
interdisciplinary approach to comfort potentially to provide new insights into the phenomenon which is comfort.

1.5 A Need for a User-Centred Approach to Domestic Comfort

Current researchers acknowledge the need to change the approach to comfort research in order to understand the relationship between domestic comfort and energy use (Moezzi & Lutzenhiser 2010). This research will take a user-centred approach to examining comfort in the home, which focuses around three main factors, for the following reasons:

- **User**: As stated above, householders’ behaviour has contributed to rising indoor temperatures, an inevitable increase in carbon emissions and the rebound effect. Taking an approach which focuses on understanding the householders’ experience of comfort could offer valuable insights into the behaviour behind these unwelcomed trends.
- **Task/Activities**: Comfort is a multidimensional phenomenon, individual householders are likely to associate varying meaning and experiences to different tasks carried out in the home and so a user-centred approach offers the necessary perspective to explore householders’ comfort activities.
- **The Environment**: Unlike a majority of building comfort research, the domestic domain is personal, intimate and controlled by the householder. Therefore understanding comfort within the householder’s environment would benefit from a user-centred approach (Shackel 1991).

1.6 Aims of the Research

The purpose of this research was to investigate the multiple dimensions of comfort in the home and generate a holistic classification of domestic comfort. The aim of this research will be met by fulfilling the following objectives:

- Identify the multiple dimensions of comfort through an extensive review of the literature in the context of the domestic environment.
· Explore the range of dimensions of comfort in the home from the perspectives of householders in a sample of UK homes.
· Investigate the key psychological dimensions of comfort from the perspective of householders.
· Determine when comfort making takes place at home in the everyday lives of householders’.
· Examine different self-reporting data collection tools for exploring comfort activities in the context of the home environment.
· Develop a holistic classification of domestic comfort based on the literature and findings from the research.

1.7 Thesis Structure

This thesis is structured into thirteen chapters; the purpose of each chapter is outlined below, chapter 1 has been used to introduce the context of this research and outline the approach, aims and objectives.

Chapter 2: Literature Review

This chapter sets the scene for the forthcoming research; it provides an overview of the current literature and outlines the gap in research which will be addressed by this research.

Chapter 3: Research Paradigm

The research paradigm chapter sets out the philosophical stance taken in this inquiry. It presents the beliefs of the investigator and the chosen theoretical perspective which have in turn shaped the methodological approach.

Chapter 4: Methodology

This chapter presents the research approach, methodology, and methods which are implemented in the data collection process, together with the data analysis techniques to examine the findings.
Chapter 5: Householders’ Perspective of Domestic Comfort

This chapter describes a study (study 1) that was conducted to explore the phenomenon of comfort from the perspectives of a sample of UK householders, through interviews. Details of householders understanding and their experience of comfort are presented in order to begin to form an understanding of the multiple dimensions of domestic comfort.

Chapter 6: Household profiles

This chapter provides short pen portrait descriptions of the participants who took part in studies 2, 3 and 4 to assist in interpreting references to each person in the text.

Chapter 7: Insights into Comfort and Daily Routines

This chapter reports on a focus group study (study 2) designed to gain valuable insights into the comfort activities of householders within their daily home lives. The data gathered through this study will be used to identify the potential comfort making activities of the participants in study 4 (see chapter 9: capturing comfort in context). This study, although brief, provided the opportunity to give of all participants’ further details of two following studies, reported in the next two chapters.

Chapter 8: Exploring the psychological dimensions of comfort in the home

In this chapter, study 3 is described which was designed for householders to capture their understanding of comfort, shaped through taxonomy of domestic comfort developed by Heijs and Stringer (Heijs & Stringer 1987) is reported. Participants from the focus group study were set tasks to help identify the social and psychological dimensions of domestic comfort in more detail.

Chapter 9: Capturing Comfort in Context

This chapter presents study 4 examines daily routines of the cohort of participants to see what role comfort plays. Self-reporting observational tools were used to try to capture the everyday activities of the householders. This study also reflects on
whether self-reporting observational tools can be used to capture the intimate and personal comfort activities of householders.

Chapter 10: Discussion

This chapter presents the cumulative findings of the previous chapters within a classification of domestic comfort. The overall research, and how it was conducted, is discussed.

Chapter 11: Conclusion

This chapter focuses on how this research can be used to move the topic of comfort and energy further in the future.

Chapter 12: References

This chapter lists the references cited in the thesis.

Chapter 13: Appendices

This section presents the materials used in the four studies.

Figure 1 shows an outline of the different chapters of the thesis.
Figure 1: Outline of Thesis
Chapter 1: Introduction

Chapter 2: Literature Review

Chapter 3: Research Paradigm

Chapter 4: Methodology

Chapter 5: Exploring Householders’ Perspective of Comfort in the Home

Chapter 6: Household Profiles

Chapter 7: Insights into Comfort and Daily Routines

Chapter 8: Exploring Psychological Dimensions of Comfort in the Home

Chapter 9: Capturing Comfort in Context

Chapter 10: Discussion: A Classification of Domestic Comfort

Chapter 11: Conclusions and Future Work

Chapter 12: References

Chapter 13: Appendices
2 Literature Review

2.1 Introduction

This chapter will present an overview of the literature from the relevant fields of research. The aim of the literature review is to identify the multiple dimensions of comfort in the context of the domestic environment.

2.2 Defining Comfort

Whilst the Collins dictionary simply defines comfort as 'a state of physical ease or wellbeing'; the word comfort can be considered to have a broad and flexible application across the literature. For centuries the word 'comfort' was predominantly associated with moral and spiritual support during difficult times, it was during the eighteenth century that the meaning of comfort for Anglo-Americans became based upon 'physical comfort' described as a 'self-conscious satisfaction with the relationship between one's body and its immediate physical environment.' This form of physical comfort gave birth to a new material culture where there was a growing desire for items such as home furnishings to provide occupants with satisfaction from their surroundings (Crowley 1999). It was during the nineteenth century the word comfort was related to environmental aspects and the physiological state.

However definitions of comfort from environmental and physiological fields vary in emphasis. Brager and De Dear describe comfort as an 'the absence of discomfort' (2003, p.178), they consider this to be an engineering definition, as the focus of comfort research is typically to eliminate discomfort. In thermal comfort, standard body ASHRAE define comfort as a 'condition of mind which expresses satisfaction with the thermal environment' which recognises the psychological nature of comfort (ASHARE 1966 cited in; Parsons 2003, p.196).

The field of nursing research also finds it challenging to agree on an overarching definition of comfort although frequently the dominating factor of nursing research (Morse et al. 1994). Nursing research focuses on three meanings of comfort, the
first is comfort as a comfort state an absence of pain, secondly, comfort to mean peacefulness and contentment and thirdly, comfort as relief from pain (Kolcaba & Kolcaba 1991).

Generally, there is an acknowledgement of a lack of clear definition in regards to comfort across and within disciplines, this often leads to the acceptance of a broad definition or list of assumptions on the topic. Looze, Kuijt-Evers and van Dieën make three assumptions of comfort before reporting on sitting comfort they state ‘1) comfort is a construct of a subjectively-defined personal nature; 2) comfort is affected by factors of various nature (physical, physiological, psychological) and 3) comfort is a reaction to the environment (2003, p.986). These three assumptions encompass several aspects of the definitions previously stated; it draws upon the relationship between state of mind and the environment as a result of various factors.

Defining comfort by discipline inevitably focuses on certain aspects which are significant to the field in questions, although Bissell (2008) attempts to offer a three-tiered definition, each definition encompassing the previous. Firstly comfort in an objective capacity, which refers to the comfort which can be experienced through the surroundings and the objects people engage with. It can be considered as a prescribed notion of comfort through sets of dimensions, measurements or scales carefully formulated to create comfort, i.e. chair design. Comfort as an aesthetics sensibility is described as a sense of feeling wholly satisfied with the surrounding environmental conditions; this refers more directly to the sensation the body feels to the surroundings and objects. Thirdly, comfort as a specific affective resonance, Bissell describes this as a form of comfort which moves between body and object, it is the type of comfort which embodies the two previous definitions to create a comfortable experience which encompasses a number of aspects such as the tactile, thermal, visual, and the audio.

Attempting to accept one overarching definition of comfort which satisfies all uses of the term is an impossible task, rather acknowledging its diversification and flexibility through research is more fitting to the exploratory nature of this research.
The definition of comfort will be revisited throughout the literature review, through the various perspectives of related fields.

2.2.1 Dimensions of Comfort

The literature dedicated to the topic of comfort is both vast and multi-dimensional; comfort is a large part of lives affecting our work, our travel and our home life. This is reflected in the varied aspects of comfort studied. The elements which contribute to whole-body comfort are not fully understood are thought to be very complex (Bissell 2008). In a search of scientific databases it is clear most research exists in field of thermal comfort above other areas such as acoustic comfort, vibration/shock comfort and physical comfort (Vink, de Looze, et al. 2005). Although these areas of comfort to an extent standalone from one another, they are alike in the sense they strive to understand how individuals are affected and interact with their surrounding environment. Traditionally comfort can be viewed as consisting of eight elements both physiological and psychological in nature (Vink, Overbeeke, et al. 2005). These are as follows:

1. Temperature/humidity
2. Pressure/touch
3. Posture/movement
4. Noise
5. Smell
6. Visual input
7. History
8. State

The eight elements are described as being interrelated, however the nature of the relationship is unknown and to what extent they lead to the experience of comfort, discomfort, or no discomfort. Research of each of the eight elements identified above will be briefly discussed.

2.2.1.1 Thermal comfort

Thermal comfort is defined as ‘the condition of mind that expresses satisfaction with the thermal environment’ (ASHARE 1966 cited in; Parsons 2003, p.196). Thermal comfort is achieved when the body is in heat balance, sweat rate and mean skin temperature are both within the comfort limits, and there is an absence of thermal discomfort. Extensive research into the optimum thermal comfort
conditions is the basis of comfort standards used in non-residential buildings today. They have resulted in rigid comfort standards which depend almost exclusively on the use of heating, ventilation and air conditioning (hereafter HVAC) systems for achieving thermal comfort (Brager & De Dear 2003). There is more to thermal comfort than objective parameters; however these factors being subjective in nature can be difficult to measure. Thermal comfort is examined in greater detail in section 2.2.2.

2.2.1.2 Pressure/touch

Pressure is generally studied in terms of sitting comfort, the physical comfort of seating will depend on the chair, the environment and the time spent sitting. The pressure from the seat can have significant effects on the body's joints, blood circulation and tissue. In a study by de Looze (2003) examining sitting comfort and identifying the best objective indicators for subjective ratings, he found pressure distribution showed the most correlation with comfort and discomfort ratings, and as a result was the best indicator of sitting comfort.

2.2.1.3 Posture/movement

The study of posture is an important part of ergonomics; whether the task is operating a work station or driving a vehicle, establishing the best posture for different task can prevent health problems and improve the user's experience. Designing for different sizes, shapes and body compositions can be a challenge; anthropometric data will normally be used to design for those between the 5th and 95th percentiles, excluding only the smallest and largest of the population. With such a wide range of sizes to accommodate for, often the designer will design for adjustability. Anthropometric data can only take a design so far, it is often valuable to complete user trials to establish how other factors such as comfort affect the user (Porter & Porter 2001).
2.2.1.4 Noise

Acoustic comfort is achieved when wanted sounds are enhanced and unwanted sounds are reduced (Reffat & Harkness 2001). Whether sounds are desired or not, depend strongly on the needs of the occupants, for example in a classroom the ability for pupils to hear the teacher is paramount for the task of learning. However the acoustic environment of non-residential buildings is normally designed to an acoustic specification which does not allow for the necessary variations. The acoustic specifications for buildings also fail to acknowledge the subjective element of acoustic comfort; an individual’s perception of sound can differ greatly from another, for instance in the enjoyment of music (Yang & Kang 2005; Krüger & Zannin 2004).

2.2.1.5 Visual input

Research in visual comfort typically focuses on the lighting of work spaces and the use of visual displays. Optimal lighting conditions are dependent on the task the occupant is completing; the main need for pleasant lighting is to reduce the effect of both disability and discomfort glare. Most work environments consist predominantly of artificial lighting in line with guidelines given by CIBSE (Chartered Institution of Building Services Engineers). However, some research has shown daylight in offices can create a more comfortable environment which actually improves individuals’ wellbeing and health, as sunlight consists of a balanced spectrum of colours, unlike artificial lighting (Edwards and Torcellini, 2002).

2.2.1.6 History

The past experience an individual has of an environment or object can affect their expectations. There are two types of experience, long-term and short-term. Long-term experience is determined by the schematic map an individual creates in their mind of different choices and decisions made under various circumstances, for example, if an individual is at home and feeling cold, their automatic reaction may be to shut the doors from previous experience they know this will help keep the
room retain warmth. Short-term experience affects an individual's memory and moulds their expectations of everyday life (Nikolopoulou & Steemers 2003).

2.2.1.7 State

A state can be described as a state of mind in which emotions are experienced; this is also referred to as an emotional experience. A state such as this cannot be observed unless the emotion is knowingly expressed to others. Studies have shown that an individual's state of mind can affect how they may perceive a product or environment. For example an occupant returning to a warm home from the cold outdoors will have a different perception of the warm indoor environment than someone who has been indoors all day (Picard 2000; Vink, Overbeeke, et al. 2005).

2.2.2 Thermal Comfort

Our initial response to the surrounding thermal environment is an automatic response by our bodies thermoregulatory system; as homeotherms our bodies try to maintain a stable internal temperature of 37°C; responses such as shivering, vasoconstriction and sweating all help our body maintain a constant internal body temperature. Although the body's thermoregulation system makes a significant difference to our ability to cope with thermal stress, we still have a drive to achieve a thermally comfortable state. The need for thermal comfort has been of importance since the beginning of human existence; whether this was expressed by adapting clothing or finding shelter. Thermal comfort has only grown in importance. Homes and commercial buildings across the developed world have heating and cooling technologies incorporated into the architectural design, to satisfy occupants' expectations to achieve thermal comfort in all climatic conditions (Parsons 2003).

Fanger’s heat balance equation has formed the foundation of extensive research in the area of thermal comfort. The equation is based on three forms of heat thermal activity; heat generated, heat loss and heat stored. There are a number of variations of the heat balance equation, however they are based on the founding concepts of Fangers work, this being, the metabolic rate of the body (M) minus the
mechanical work done (W) should be equal to the loss of heat through evaporation (E), radiation (R), convention (C), conduction (K). The combination of heat production and heat loss components is equal to the amount of heat stored (S):

\[ M - W = E + R + C + K + S \]

If heat storage is zero then the body is in heat balance, (S=0):

\[ M - W - E - R - C - K = 0 \]

The methods based on Fanger’s heat balance equation were the first to take into account the occupants requirements. His method combined six parameters of thermal comfort, these being air temperature, humidity, air velocity, radiant temperature, metabolic rate and clothing. These six physical factors were based on three conditions necessary for human thermal comfort, these being, ‘the body is in heat balance, sweat rate is within comfort limits and mean skin temperature is within comfort limits’ (Parsons, 2003: 204). This was the basis for developing Fanger’s predicted mean vote (hereafter PMV) comfort equation, a qualitative tool used to predict the occupants’ satisfaction of with their thermal environment.

2.2.2.1 Thermal Assessment

In order to calculate thermal comfort, data is needed on each of the six parameters. Air temperature, humidity, air velocity and radiant temperature are all parameters which are normally measured on site. Metabolic rate can normally be estimated using existing tables and databases containing the estimated metabolic rates for different occupations, tasks or general levels of exertion (resting, low, medium, etc). Clothing is normally estimated from databases of clothing insulation values for different ensembles.

Subjective measures are often used alongside quantitative methods to assess thermal environments. The International Standardisation Organisation (hereafter ISO) sets out guidance on using subjective scales in which they divide approaches into two types, personal and environmental. Those which are personal ask
participants to describe their perception of their surrounding environment, while an environmental approach asks participants to consider how acceptable or tolerable they find the environment. Rating scales measuring thermal warmth or thermal comfort are normally administered; the most common scales used are the Bedford comfort scale and the ASHRAE scale shown in Table 1:

<table>
<thead>
<tr>
<th>Bedford Comfort Scale</th>
<th>ASHRAE Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>+3  Hot</td>
</tr>
<tr>
<td>6</td>
<td>+2  Warm</td>
</tr>
<tr>
<td>5</td>
<td>+1  Slightly warm</td>
</tr>
<tr>
<td>4</td>
<td>0  Neutral</td>
</tr>
<tr>
<td>3</td>
<td>-1  Slightly cool</td>
</tr>
<tr>
<td>2</td>
<td>-2  Cool</td>
</tr>
<tr>
<td>1</td>
<td>-3  Cold</td>
</tr>
</tbody>
</table>

(Parsons, 2003)

2.2.2.2 Thermal Indices

The PMV index is just one of many thermal indices which have been devised, in fact there are thought to be over 100 thermal indices all of which differentiate slightly from each other. Humphreys (2005) compares two thermal indices PMV and Standard Effective Temperature (SET), using a database of thermal comfort surveys from 20,000 thermal environments, he found there was a significant amount of variation between the values given from both indices for the same environment, suggesting a lack of consistency amongst the indices. He further stated that if in one environment the radiant temperature was high and the air temperature was low, this could give the same value on the PMV index as an environment that has equal radiant and air temperature; thus the value could give an unclear expression of the environment.
2.2.2.3 Current Thermal Comfort Standards

Several thermal comfort standards have been developed by various national and international institutions. The standards define the optimum thermal comfort standards and can also provide information on the number of dissatisfied occupants over a range of thermal comfort conditions. There are two current standards for thermal comfort in practice, these are ISO 7730: Ergonomics of the thermal environment and ASHRAE Standard 55: Thermal environmental conditions for human occupancy. They are both based on Fanger’s thermal comfort model which only takes into account the physiological factors of which effect occupants’ satisfaction of thermal environment.

![Figure 2: Thermal Comfort Model from Fanger (ISO74)](image)

Current indoor standards typically consider thermal conditions, air quality and acoustical conditions. The aspects are all developed and implemented separately with little consideration for the way in which they interact with each other (Toftum 2002). Several standards concur to this strategy, including European standards CEN Report 1752 and EN 1521, both include several factors of the environment but separately, when in practice the multiple factors are likely to influence each other. In a study comparing data from several environmental surveys (thermal, lighting
and acoustic), Humphreys (2005) found dissatisfaction across several aspects of the environment did not necessarily lead to overall dissatisfaction, likewise, satisfaction with several aspects does not necessarily lead to overall occupant satisfaction. This suggests there is a relationship between the multiple factors of the indoor environment which affects occupants’ satisfaction.

2.2.2.4 Adaptive Thermal Comfort

Not only has there been a call to consider the relationship between the multiple aspects of the indoor environment, concerns have been raised over the limited nature of Fanger’s thermal comfort. In reviewing Fanger’s work, Auliciems (1981) noted occupants satisfaction of indoor thermal environments was based on the assumption that a lack of thermoregulatory activity must constitute occupant satisfaction, and perceived warmth is based solely on physiological factors. As a result he developed an alternative psycho-physical model of thermal comfort which takes into account psychological nature of indoor thermal comfort, including thermal expectations and the climatic influences:
The psycho-physical model has led many researchers to reflect on the significance of psychological aspects of indoor thermal environment. Significant contributions to the integration of psychological aspects into thermal comfort standards, have been made by De Dear and Brager (1998). They devised an adaptive model of thermal comfort in response to two issues, firstly the current energy-intensive environmental controls and secondly, the lack of flexibility towards strategies of thermal variability. The model incorporates three forms of adaption, behavioural adjustments, physiological and psychological. Behavioural adjustment refers to the changes which the occupant will make consciously or unconsciously to maintain the body's heat balance, this may include drinking water to cool down, or putting on extra clothing to keep warm. Physiological adaptions are described as those which alter the physiological response of the body this may include acclimatization through the long-term exposure. And finally psychological aspects of thermal
Adaption reflects on the influence of past experiences and expectations on occupants’ thermal comfort. Through a large scale project based on thousands of human subjects in building studies across the globe, De Dear and Brager found that indoor temperature which ranged outside the comfort zones established by standard ASHRAE 55 were actually acceptable to the subjects suggesting a more dynamic thermal environment would be acceptable by building occupants.

In practice, the introduction of energy conserving systems to ventilate buildings such as natural ventilation systems or mixed mode systems have become more accepted and encouraged. Natural ventilation is defined 'as ventilation provided by thermal, wind or diffusion effects through doors, windows, or the intentional openings' (Emmerich et al. 2001, p.3) as opposed to mechanical which is classified as ventilation powered by motor-driven equipment. Running a natural ventilation system will inevitably save energy as no power would be needed at all, and consequently save money which is likely to key to encouraging the incorporation of such systems in the future.

The building occupants also play a large role in the acceptance of natural systems, the level of thermal consistency experienced in most HVAC building could not be maintained with a natural ventilation system; occupants would certainly experience a wider range of indoor temperatures. Brager and De Dear (2000) compared naturally ventilated buildings to HVAC buildings; they found the occupants in the naturally ventilated buildings wore a wider range of clothing through the various seasons than those in the HVAC building. Their study also showed that occupants of HVAC buildings accepted a narrower variation in thermal conditions when compared to those in naturally ventilated buildings, perhaps this is due to the expectation of consistency occupants have become used to from HVAC systems; occupants in naturally ventilated buildings showed a preference for a wider variation in conditions.

2.2.3 Comfort and Human Needs

The phrase ‘human behaviour’ is used as an umbrella term to describe a vast number of aspects from sub-conscious operant behaviour to conscious decision-making.
making. Of particular interest here is how human behaviour is shaped and transformed by the world around us, several elements such as culture, emotions, attitudes, and environmental factors can affect individual choice and behaviour (Skinner 2005). Maslow (1970) theory of human motivation outlines seven levels of needs; basic needs, safety needs, love/belongingness, esteem needs, cognitive needs, aesthetic needs and finally the need for self-actualization. The diagram below shows Maslow’s hierarchy of needs.

![Maslow's Hierarchy of Needs (1970)](image)

**Figure 4: Maslow's Hierarchy of Needs (1970)**

**Biological and physiological needs** – the most basic of all needs drives individuals to have enough food, water, and shelter, in order to live. It also includes homeostatic processes such as the body’s automatic attempts to keep the body in heat balance.

**Safety needs** – the second level, the need for safety, once physiological and biological needs are met individuals will strive to feel secure at home, in employment, and to have a stable life.

**Belongingness and love needs** – this need for love and a sense of belongingness refers to an individual’s desire to feel accepted, to love and to be loved by others in their lives, this could include friends, a partner, or family.
**Esteem needs** – esteem is used an umbrella term for people’s motivation to be confident, capable, reputable and strong achievement of these needs will leave the individuals with higher self-esteem.

**Cognitive needs** – an individual’s thirst for knowledge and understanding, an individual strives to have the ability to know, comprehend and analyse day-to-day information and situations.

**Aesthetic needs** – aesthetic needs was one of the needs added to the revised hierarchy it recognises the need for beauty, order and symmetry in life.

**Self-actualisation needs** – this need is reached when an individual realises their full potential and achieve what they are most fitted to do, this goal will differs greatly from person to another.

Maslow suggests it is not necessary to completely satisfy one level in order to move onto the next, for example, an individual could have no access to regular food and water but could still have loving relationships with others. If the physiological and safety needs are not fulfilled they are likely to take priority over higher needs (Maslow 1970; Smith et al. 2003).

Maslow's motivational theory follows a goal centred approach, so the need for safety, esteem, etc., are goals achieved by an individual's behaviour, this runs parallel to Shove's view of comfort as an achievement which requires an action or series of actions to reach (2003a). Take thermal comfort as an example, to suggest that the current thermal comfort levels occupants achieve in their homes through heating are set at a temperature which only satisfies their physiological needs, is not a notion supported by the statistics which indicate rising internal temperatures. The thermal conditions are also likely to be affected by other factors such as present outdoor climate, the effectiveness of installed heating/cooling systems, energy prices and the preferred temperature for occupants; will all play a role in the indoor temperature set by the householders (Palmer et al. 2012). The ability to control the indoor temperature has given occupants the opportunity to maintain higher temperatures and construct their ideal conditions (Shove 2003a).
As another example of the parallels between needs and comfort, Maslow’s hierarchy of needs also draws on the need for social comfort in the sense of love and belongingness. Creating and maintaining social relationships is considered to be socially normal and an important element of human behaviour. Social relationships are normally built on commonalities (similar interest, shared experiences, etc.) and are maintained through the exchange of goods and services (for instance the time spent on the relationship and favours) between the two parties. Social comfort can be achieved through building and maintaining healthy and successful relationships which would satisfy the need for love and belongingness (Cialdini & Trost 1998).

The final level of Maslow’s hierarchy of needs is self-actualisation which is when an individual reaches their full potential; this level has a sense of completeness, in that all that could be achieved, has been achieved. In terms of comfort, potentially it could be possible to achieve a state where all lesser comfort levels are satisfied and one is fully comfortable. Perhaps comfort at home is to have an environment which allows for self-actualisation to occur. Heijs and Stringer’s (1987) work in which they classified different forms of comfort that a dwelling can provide, identified two forms of comfort which could help occupants reach self-actualisation; these were facilitative comfort and personalisation comfort. Facilitative comfort refers to the home’s ability to provide the occupants’ with the freedom to complete the task or hobbies they wish to; and as a result their home allows them to reach self-actualisation. Personalisation comfort describes a home where occupants can personalise to their taste, giving their own identity to their environment; this can help individuals reach esteem needs (by improving their image), aesthetic needs and self-actualisation. To achieve a full state of comfort perhaps a home can provide an individual with the freedom of action, be it simply to relax or create time and space for hobbies, with no restrictions an individual could reach a point of complete comfort experience.

By applying a hierarchical approach similar to Maslow’s hierarchy of needs, the notion that comfort is strived towards can to some extent be explained; Maslow stated once one level of needs are met, individuals feel motivated to fulfil the
needs of the next level; as a result the motivation to fulfil the needs of the first level is diminished. It seems this approach suggest that we are always striving for more, be it self-actualization or an overall comfort experience. This is supported by a psychological phenomenon known as the hedonic treadmill which state's 'good and bad events temporarily affect happiness, but people quickly adapt back to hedonic neutrality' (Diener et al. 2006, p.305). It could be possible the hedonic treadmill and Maslow's hierarchy of needs could apply to the notion of comfort, for example it could explain the escalation of energy consumption on space and water heating in the domestic environment. Once the thermal conditions at which the physiological needs of the body are satisfied, occupants then strive towards reaching a temperature which is preferable (i.e. warmth) (Hajiran 2006; Diener et al. 2006).

2.3 Domestic Comfort

2.3.1 The Meaning of Home

'Home' is a complex and multidimensional notion, inclusive of physical, psychological and socio-cultural aspects, different disciplines approach the meaning of home from varying perspectives and thus defining home has proven challenging (Somerville 1992; Moore 2000; Sixsmith 1986). Defining the home often takes three main focal points, a materiality and structural definition is typically used by the more physical disciplines, whilst there is extensive literature exploring the psychological meaning of home such as notions of identity and control, whereas the meaning of home can also be derived from the social interactions and activities of householders. With the home having such a multidimensional nature many researchers approach it from an interdisciplinary approach to defining home, Somerville (1992) approached the meaning of homelessness by initially defining the signifiers of home, Somerville provides six 'key signifiers' to the meaning of home based on an examination of the extensive literature these were shelter, hearth, heart, privacy, roots, and abode. The six signifiers were comprised of both physical and non-physical meanings of home;
shelter was described as the physical infrastructure which provides refuge from the elements; hearth and heart although similar in nature, hearth was classified as a physiological factor providing the feeling of warmth and a homely atmosphere, whilst heart provided an emotional security and the feeling of love and happiness for the occupant. The meaning of abode was to represent place, and a space to live, whilst privacy referred to the territorial power and control occupants had over this space. Finally roots connoted to a source of identity, the mirror of oneself; Somerville suggested some of these signifiers of home were experienced by homeless individuals such as heart, the feeling of love, clearly indicating the meaning of home is more than just the physical structure.

Sixsmith (1986) offered a varying classification of the meaning of home based on data collected through multiple sorting task (MST) interviews with 22 postgraduate students. The study identified three distinctive themes in the meaning of home physical aspects, social aspects and personal aspects. As expected, the meaning of the physical aspects included items such as structure, architecture and spatiality, social aspects focused on the social interactions experienced between householders and guests they may entertain. Personal factors drew upon an array of meanings some of which were psychological in nature such as a sense of belongingness, self-expression, and happiness, as well as additional features such as privacy, knowledge and time. Sixsmith concluded there are multiple dimensions to the meaning of home, not all of which will be significant to all individuals therefore one individual’s meaning of home may not necessarily match another individual’s; however Sixsmith gave the following definition of home:

“Home is a multidimensional phenomenon, neither unidimensional nor created from a set of standard qualities pertaining either to the person or the place. Rather each home features a unique and dynamic combination of personal, social and physical properties and meaning.” (Sixsmith 1986, p.294)

This definition accepts the individuality of the ‘home’, and can be applied widely to various different types of home. It supports householder’s personal ideals of home and therefore is also strongly suited for the user-centred approach of this research.
2.3.1.1 Qualities of a Home

Homes provide the features needed to conduct an array of activities; and is the setting for comfort to be experienced. The multiple dimensions of the home allow individuals to create the type of home which meets their needs; therefore some dimensions will be more prominent and significant than others (Sixsmith 1986; Smith 1994; Marcus 1997). A study conducted by Smith (1994) was designed to explore the positive and negative qualities of the home environment through interview. There were significantly clear themes regarded as positive qualities of the home these were physical, social and personal qualities, mirroring Sixsmith’s (1986) study classifying the meaning of home. The positive physical qualities identified in the finding included physical features and aesthetics of the homes for instance the décor and the openness of spaces. Positive social aspects discussed by householders noted having good relationships with other householders, and how experiencing positive interactions helped to create a positive atmosphere, a desirable quality for the home. The positive personal aspects identified included personalisation through displaying personal possessions, and freedom of movement around the home. What was highlighted by this study was the broadness of factors considered to contribute to a positive home environment. Smith also emphasised the significance of a positive atmosphere which he described as associated with a feeling of warmth and cosiness and “an essential characteristic of home” (Smith 1994, p.43). Atmosphere at home was explored by Pennartz (1986) his study indicated atmosphere was derived of a collection of spatial and non-spatial components. Five non-spatial themes were identified communicating with others, being accessible to others, being relaxed after work, freedom of action and being engaged with activity (not bored). Findings also indicated the physical context identifying three factors of the physical environment which influence the atmosphere these were the layout of the rooms within the home, size of rooms and shape of the rooms. Householders expressed a desire for open spaces, and open doors to allow for communications with others which created a pleasant experience. Pennartz (1986) found room size was also an important factor for householders they desired rooms to be large enough for social
interactions and other activities which householders desired to do at home. The emphasis given to a positive atmosphere in order to have a pleasant home environment draws on the importance of comfort (Sixsmith 1986; Pennartz 1986; Smith 1994).

This poses the following questions, if the home holds the qualities an occupant desires does this necessarily make the environment comfortable? There is an undeniably link between the positive qualities of a home and comfort; this link appears to be stronger with qualities characterised as personal such as personalisation, belongings, freedom of choice and familiarity (Pineau 1982; Sixsmith 1986; Heijs & Stringer 1987; Marcus 1997; Miller 2008). This invariable link between qualities of the home and comfort is particularly evident in Heijs and Stringer (1987) classification a four fields of comfort in the home; details of this classification system will be discussed in the following section.

2.3.2 Heijs and Stringer’s: Properties of a Dwelling

Focusing on the social and psychological aspects of domestic comfort, environmental psychologists Heijs and Stringer classified key properties to create a comfortable home environment. They conducted a conceptual analysis of literature on domestic comfort which spanned across various disciplines; and developed a taxonomy consisting of four major fields; these were personalisation, facilitative, perceptual and interactive comfort. The aim of the taxonomy at the point of development (1987) was to address the following points, firstly, the lack of literature which considered psychological and sociocultural aspects of comfort in the home, they note a majority of literature focused upon the link between wellbeing and specific technologies however none which focus solely on comfort. Secondly the taxonomy aimed to provide clarity of the social and psychological qualities of a home. It is important to stress the taxonomy was created to represent qualities which the home environment should possess, the four fields distinguished are not experienced exclusively but are interconnected and mutually influenced by each other.
2.3.2.1 Personalisation comfort

Heijs and Stringer described the personalisation comfort as "the transformation of a house into a home" (Heijs & Stringer 1987, p.346), it was the process of bonding with the property through the householders’ choice in décor, furnishings, displaying keepsakes and possessions. By choosing these aspects of their surroundings to their taste, householders could stamp their personality on their property. Heijs and Stringer’s description of personalisation also stretched to the outside of the property referring to ‘territorial markers’ in order to make the home identifiable from the outside. Notions of self-expressions and identity within the home are frequently identified as desired qualities of the home environment (Sixsmith 1986; Smith 1994). A study conducted to examine the psychological meaning of comfort identified four main themes amongst freedom of choice, space and warmth, personalisation was also strongly associated with comfort (Pineau 1982). His study which was conducted with 400 female participants through interviews and questionnaires found almost all respondents considered having a personalised décor and arrangement of furnishings an important part of feeling comfortable. Personalisation also drew upon the significance of familiarise surroundings, Pineau found respondents strongly associated familiar surroundings and belongings with comfort at home this was also considered important quality in Smith’s (1994) study.

2.3.2.2 Interactive Comfort

Interactive comfort is described as the freedom of choice which a home offers in terms of social contact with other householders and the outside world. A home should offer both spaces for privacy and for social interactions which can be used as desired by householders. They further note privacy can refer to both visual and audio isolation from other householders, for instance having separate rooms whilst social interactions benefit from having sufficient space available. Heijs and Stringer recognised that interactive comfort also touched upon facilitative comfort in terms of the room size, spaces available and the home’s ability to accommodate such interactions. It also includes the area surrounding the property; they note the
neighbourhood should provide the possibility for social interactions, interaction with other residents and the freedom of choice in a similar way to the internal environment. Privacy in the sense can be defined as ‘an interpersonal boundary-control process, which paces and regulates interaction with others’ (Altman 1975, p.10). Two distinguishable levels of privacy are described desired privacy and achieved privacy; whilst an individual may wish to limit their amount of social interaction; this may not necessarily be an achievable level. As Heijs and Stringer (1987) identified for the achievement of interactive comfort, the home needs to offer privacy from other householders and outsiders, in so householder will be able to achieved their desired level of privacy. Pennartz (1986) study also supported the notion of social interaction for providing a pleasant atmosphere at home, he found people noted positive communications with householders and the layout of rooms as properties of atmosphere. Despite the importance of space and layout in creating a pleasant atmosphere, Pennartz (1986) study found residents viewed being shut away from others (closed doors) as contributing to an unpleasant atmosphere suggesting a balance is required between social interactions and privacy.

2.3.2.3 Facilitative Comfort

Facilitative comfort is described as the quality of the home which allows both desirable and necessary activities to be completed with ease. Various different types of activities take place in the home and in order to be able to conduct them with ease consideration must be given to accessibility, furnishings, room dimensions, and the adaptability of space. Facilitative comfort also comprises of the freedom to make changes to the property, for instance the addition of an extension to the property. Furthermore the activity patterns of other household members also have a role to play in facilitative comfort, knowing other householder’s activities and having enough space to avoid clashes in room use are likely to improve facilitative comfort. A large scale study conducted by Oseland and Raw (1991) investigated the link between room size and adequacy of space in small starter homes (one bedroom or bedsit). The survey-based study was conducted
across homes in England and Scotland using both postal and interview surveys, responses were collected of nearly 700 homes including 150 homes where interviews were conducted and measurements of room dimensions were collected. They found that a majority of respondents felt they had inadequate space, the main issues including limited space especially of main rooms (living rooms) describing them as too small, this impacted on the way in which they used the space; a majority stated they would entertain more if they had the room. Sixsmith's findings also drew upon the significance of knowing the activity patterns of others householders stating “their habits, emotions, actions, etc., indeed the very knowledge that they are there, which creates an atmosphere of social understanding” (Sixsmith 1986, p.291).

2.3.2.4 Perceptual Comfort

The field of perceptual comfort refers to the perception of stimulus and the subsequent afforded behaviour. Heijs and Stringer (1987) described three key aspects to perceptual comfort, firstly the order and organisation of stimuli to evoke the expected behaviour this is typically achieved through grouping similar stimulus and maintaining order. Secondly, perceptual comfort refers to the perceived dimensions of the property, clearly the scale of space is fixed however individuals will make judgements based on their own perception of the dimensions which can be dependent on the organisation or layout of possessions and décor of the property (i.e. light colour may give the impression of more space). Thirdly, this area focuses on the expression of qualities associated with the perception of the environment, for instance a room could feel ‘cosy’ or ‘spacious’. The belongs of the home are frequently categorised and ordered by householders, the orderings which they choose are distinct and unique to their home, adhering to qualities of personalisation. Maintaining order can be seen as symbolising the safeness of home, which is why clutter and untidy environments are organised (Swan et al. 2008). To revisit Oseland and Raw (1991) study of adequacy of space in UK homes, they also found a difference between perceived an actual spatial dimensions, they noted householder who felt the space they had was inadequate did not necessarily
have smaller spaces than those who felt it was adequate, rooms which were perceived to be well designed were perceived to be larger and surprisingly homes with small window spaces were perceive to be adequate. The relationship between perception of space and actual space were considerably complex.

2.4 Energy Use and Domestic Comfort by Disciplines

This section will give an overview of the various fields of energy use and comfort research in the home. Four broad perspectives can be outlined to conducting research in this field engineering/technology, economics, psychology and sociology. Much of the research has been dominated by a focus of the physics-technology-economics model (PTEM) approach to how energy is consumed, however it is argued that this approach misses vital contributions from the social sciences. Below will discuss the main contributions from the four broad perspectives named above in relation to this research (Moezzi & Lutzenhiser 2010).

2.4.1 Engineering and Technology

Research from the perspectives of engineering and technology tends to dominate the current focus of energy reductive measures due to the potential saving which could be made. The UK housing stock is one of the oldest and least efficient in Europe, the current poor quality of the building fabric means space heating equates to approximately 60% of energy consumed in the domestic sector (Boardman et al. 2005). With this in mind, there is focus on refurbishing existing housing stock through energy efficiency measures such as improved insulation (cavity wall insulation, loft and floor insulation, double glazing, etc.). The solid wall housing stock currently amounts to 26 million homes in the UK, the majority of which have cavity walls, are recognised as being particularly ‘hard to treat’ and ‘hard to heat’ home of the existing housing stock, retrofitting in order to reduce heat loss by improving the thermal performance of the building envelope and heating system is considered paramount (Vadodaria et al. 2010).
Technological perspectives have also focus on the energy-conserving technologies. This includes the implementation of smart metering, as stated in the introduction the government initiatives sets out to introduce smart meters into all UK homes in the next ten years. Research from the Netherlands and America has shown that when smart metering is implemented simply as a piece of equipment without proper consideration for social aspects, it has resulted in a rejection of the technology. The customer has perceived the equipment as an unwelcome invasion of their privacy (Darby 2010). In the UK smart meters are considered to be socio-technical feedback systems which provide the householder with tailored feedback on their own energy use. Findings have shown energy savings from direct-feedback between 5-15%, there are number of qualities required for feedback to be successful such as detailed appliance information, user display options and offering comparison on previous years. The use of smart metering has resulted in the occurrence of the rebound effect which is discussed in the next section.

2.4.2 Economics

Economics approaches (and in particular behavioural economics) to household energy use have focused on areas such as time-of-use price elasticity, calculating the energy efficiency gap and the rebound effect. As described in the introduction of this thesis the rebound effect has been defined and researched by behavioural economists, based on neo-classical principles the rebound effect is defined as follows:

“Technological progress makes equipment more energy efficient. Less energy is needed to produce the same amount of product, using the same amount of equipment. However, not everything stays the same. Because the equipment has become more energy efficient, the cost per unit of services of the equipment falls.” (Berkhout et al. 2000, p.426)

Although the rebound effect has been defined, the phenomenon is proving challenging to explain as the above definition suggests 'not everything stays the same'; but what changes is the question. Identifying the source and size of the rebound effect is significant to the economics approach; direct rebound effect
provides the clearest evidence of its existence. Research has found evidence of the rebound effect of residential space heating, when energy efficiency technologies have been introduced such as improvements to insulation it has resulted in a direct increase in energy use (Greening et al. 2000). For example, a study conducted of retrofit buildings in Austria calculated the rebound effect to be between 20-30%, this being the difference between the estimated savings and the actual savings. The researchers concluded the rebound effect should be taken into account when initial estimation are calculated for the energy saving capabilities of specific energy efficient technologies (Haas & Biermayr 2000). In attempts to calculate the size of the rebound effect for space heating, economists typically focuses on the inputs and outputs of specific energy services, several different methods have been used which account for the variation in calculation. Unfortunately socio-cultural factors are rarely included although could provide significant insights, such as householders’ attitudes to thermal comfort or their activity pattern. While they are recognised to have an effect they are typically not considered in the estimations given by economics (Greening et al. 2000).

2.4.3 Sociology

Sociological approaches have focus on understanding everyday practices. In order to do this, it is necessary to breakdown the complex interlocking relationship between multiple dimensions. The theory of the co-evolution of comfort is put forward by sociologist Shove (2003a), this theory offers an insight into everyday practices and explores the socio-technical components of comfort. Shove uses the term 'co-evoive' in order to explain the relation between both social and technical dimensions of comfort, the theory explores three dimensions of co-evolution:

- The relationship between specific technologies or material infrastructure and social practices or procedure.
- The relationship between specific technologies or material infrastructure and socio-technical systems of collective conventions and meaning.
- The relationship between socio-technical systems of collective conventions and social practices and procedures (Shove, 2003).
Below the element of the structure will be discussed and applied to everyday life.

**The material infrastructure or specific technologies** - refers to the product, technology or material in question, for example a television, a central heating system or water supply could be classified under this heading.

**Socio-technical systems of collective conventions** - describes the social meaning behind the action of practices, social influence in particular 'social norms'. Norms are defined as a 'psychological phenomena, a construct that has widespread usage because it helps describe and explain human behaviour' (Cialdini & Trost 1998). Normative behaviour is that which has more commonalities with the social collective unit rather than individual behaviour. Often social norms are formed on the basis of fulfilling basic needs.

**Social practices and procedures** - practices are defined as an action, or series of actions carried out as part as completing a task; practices are normally closely linked to social normatives. The term 'procedure' refers to the habits and routines of individuals; habits being 'behavioural tendencies' which are acquired in a similar process as skills (Ouellette & Wood 1998, p.52).

The theory of co-evolution can be applied to the practice of bathing or showering every day. The material infrastructure in this case refers to the water supply; the meaning behind the practice refers to the feeling of freshness and improved hygiene; the procedure refers to the habit or routine of showering everyday (Shove 2003a). Several practice-orientated studies have supported the three dimensions put forward by Shove, a study by Scott, Quist and Bakker (Scott et al. 2009) examines bathing practices. The ethnographic study used group workshops and probes to collect data on participants bathing practices; participants were asked to challenge their current bathing practices and unveil the reasons behind their actions. The study found participants felt there were different acceptable levels of cleanliness for different environments home, work, etc; one of the main reasons for showering was to remove body odour which they felt can be important for self-confidence; using hot water whilst showering was also deemed important for keeping warm. They found participants automated bathing practices were encouraged by the idea that products 'do the job' (Scott et al. 2009, p.8); they
suggested that perhaps the body care industry have to some extent shaped bathing practices by developing 'daily use' products. By taking a practice-orientated approach it is hoped user will understand social norms and influence them the change the practices of their everyday life for a more sustainable lifestyle.

2.4.4 Psychology

Psychological contributions have focused on the individual householders’ attitudes, behaviour and choices towards energy use (Moezzi & Lutzenhiser 2010). There are a number of cross-overs between psychology and other disciplines as previously noted behavioural economics and the study of the rebound effect, and the significance of social norms to the co-evolution of practices. Psychological contributions are typically made alongside other incentives; combing non-financial incentives with financial incentives for householders can strengthen the acceptance of new energy policy (Stern 2011). Choices in energy policy can also be heavily influences by psychological contributions, often policy supporting new technologies are implemented as this is perceived more positively and as an improvement to the quality of life, rather than the policies supporting the cutting of energy use as this is perceived as a sacrifice (Stern 1992).

Psychological research has also focused on the dissemination of information to householder on energy use and effective ways to live a more sustainable lifestyle. This is based on the belief that if behaviours are internally driven and framed by the external circumstances, if those external circumstance change, behaviour change is possible. To address the lack of accurate information provided to US householders on the effective action to reduce carbon emissions, Gardner and Stern (2008) developed a list of the most effective actions householders could take to reduce their energy use at low to no cost to themselves. The list of 27 effective actions were estimated to save more energy and reduce carbon emissions more than reducing energy use of inefficient systems. The list included actions such as turning the thermostat down from 22°C to 20°C, turning the A/C up from 23°C to 25°C and also actions outside of the home such as changing driving behaviour. By identifying
the most effective actions, individuals who more likely to act sustainably are more likely to make the biggest difference (Manning 2009; Gardner & Stern 2008).

Significant insight into decisions making and behaviour change have been contributed by behavioural economists Thaler and Sunstein (2009). They note decision making can be influenced by the organization of things, thus the way in which things are organised can nudge people towards choices in different directions. This is known as choice architecture and is typically considered as an economics intervention however is clearly rooted in psychology and conveying the right information to consumers. Thaler and Sunstein described various ways in which nudges can be achieved, for example through the use of feedback; customer could be nudged towards desirable behaviours. Feedback was used as an intervention by an electricity supply company; they sent customers an ambient orb which flashed red if customers used too much energy at home. Psychological aspect of energy use are typically addressed in combination with other factors; behavioural sciences have contributed heavily to understanding the motivations of householder behaviours and identifying opportunities for change.

2.5 Conclusions

The findings from this review present several dimensions of comfort whilst highlighting the dominance of thermal comfort within the literature. There is a lack of holistic approaches to comfort across disciplines, rather, factors are considered in isolation with little attention played to the potentially influences, relationships and connections between factors.

The current divide and control approach to residential energy use and the dominance of the Physical-Technology-Economics Model has limited progress of the understanding of the complex real world of household energy consumption. The home environment provides a space where householders make the choices and behave differently, and use the space differently from other spaces typically studied within these fields (such as work or public spaces). The structured and rigid sense comfort in researched, appears to be out of sync to the unstructured and personal ideals of comfort explored by environmental psychologists. This research
aims to explore the multiple dimensions which composite the phenomenon of domestic comfort from the perspective of the householders within the context of the home.
Chapter 1: Introduction

Chapter 2: Literature Review

**Chapter 3: Research Paradigm**

Chapter 4: Methodology

Chapter 5: Exploring Householders’ Perspective of Comfort in the Home

Chapter 6: Household Profiles

Chapter 7: Insights into Comfort and Daily Routines

Chapter 8: Exploring Psychological Dimensions of Comfort in the Home

Chapter 9: Capturing Comfort in Context

Chapter 10: Discussion: A Classification of Domestic Comfort

Chapter 11: Conclusions and Future Work

Chapter 12: References

Chapter 13: Appendices
3 Research Paradigm

Research is shaped by the beliefs and research process applied by the investigator. Whilst it might be tempting to begin by describing the research process at the method stage, it is helpful first to define the beliefs of the investigator and the theory of knowledge applied to the research design to provide solid foundations for conducting the research. The research approach applied will define the nature of the inquiry; guide the methods chosen and noticeable shape the outcome of the research. This section will provide an overview on a selection of research paradigms and strategies prior to clarifying the philosophical stance taken by the investigator for this research and the methodological approaches which will guide the data collection process.

Research paradigms are defined as “basic set of beliefs that guide action” (Denzin & Lincoln 2000, p.157), they are typically distinguished by three concepts: the chosen ontology, epistemology and methodology. Ontology is the study of what exists or what can be understood to exist, it is directly associated with a researchers’ epistemological stance, their belief of how knowledge is formed; which shapes the chosen methodology. Paradigms are fundamental principles for researchers to follow which define the researchers’ world view, the research process and the way in which the findings are understood (Lincoln & Guba 2000; Hignett 2005; Gray 2009). Several philosophical viewpoints exists which can differ immensely across the three aforementioned concepts. The distinctions, contradictions, and similarities between various philosophical viewpoints have been rigorously debated for several decades resulting in the emergence of several alternative perspectives fitting to the breadth of research approaches and methods now available in particular research perspectives for doing social research (Robson 2002; Gray 2009).

3.1 Philosophical Stance

The major distinction between philosophical stances exists between quantitative and qualitative inquiries. For quantitative research, positivism and post-positivism have been major philosophical strands applied to such research, whilst for
qualitative inquiries strands of interpretivism and constructivism have played significant roles. The acceptance of more than one paradigm may be suitable for some research inquiries; the researcher may choose to blend two paradigms which share the same beliefs and values. Major philosophical viewpoints will be examined further.

Positivism was predominantly used for quantitative social inquiries during the 1930’s and 1960’s, this position views knowledge as being objective in nature, and thus existing externally to the human mind. Baring comparison to natural sciences, positivism argued from the ontological stance of naïve realism which states reality is based on the collective sensory impression of the external world. Inquiries under positivism are based on empirical evidence through scientific observations and aim to verify hypothesis and legitimise facts rather than provide insights. The nature of scientific observations requires the researcher be in control and remain inactive throughout the inquiry, and involvement is seen as a threat to the validity. However many philosophers have strongly challenged positivistic stance, highlighting several fundamental issues and shortfalls in the theory, for instance the breadth of scientific inquires encompasses more than what can be observed, many fields of scientific research based purely on mathematics. Philosophers have also argued against the treatment of findings from observations as facts, when one instance could falsify the hypothesis, therefore how can any hypothesis truly be proved to be true, they can only be proved to be false (Lincoln & Guba 2000; Robson 2002; Gray 2009).

The failures of positivism have been somewhat addressed in the development of post-positivism, unlike positivism it treats the nature of knowledge as probable facts until proven otherwise and thus inquiries work with non-falsified hypotheses (Lincoln & Guba 2000). Similarly to positivism, post-positivism views the accumulation of knowledge as a result of smaller building blocks which contribute towards a richer knowledge base. It is based on an ontological stance known as critical realism similarly to naïve realism, critical realism stance states that the world exists externally of the subject. However, critical realists believe the observed cause and effect relationship does not necessarily equate to fact, as a result,
inquiries lean towards a focus on the mechanisms and the context of the causal relationship. At the heart of this stance is the rejection of the belief that human behaviour can be observed through scientific methods. Similarly to positivists, post-positivists believe there is one reality both researcher and subject are independent actors within the research process, however they acknowledge and accept that the researcher’s background knowledge and existing theories may influence what and how they choose to conduct the scientific inquiry.

Both constructivism and interpretivism are closely linked, the roots of which lie within the relativist position. Relativism is the belief that reality is formed of human consciousness rather than existing externally. Although this is at the heart of the concept, a majority of relativists do not conform to such an extreme notion but rather applying relativism to the social world, believing multiple realities and truths are socially constructed in one’s consciousness (Robson 2002; Sale et al. 2002). Relativists also consider scientific accounts and theories as equal to those accounts of the social world; it takes the position that all accounts describe the world in some way. Constructivism and interpretivism accepts that the interaction between researcher and subject is required to gain a deeper understanding of the chosen topic, but also creates an interpretation which is constructed from the interaction between researcher and subject. Kant’s describes this as “human perception derived not only from evidence of the senses but also from the mental apparatus that serves to organize the incoming sense impressions” and that “human claims about nature cannot be independent of inside-the-head processes of the knowing subject.” (Robson 2002; Ponterotto 2005, p.129).

As outlined in the study aims and literature review in the previous chapters, current research fails to consider a holistic notion of comfort, this research aims to understanding the experience of comfort at home; in particular, the less researched and less understood areas of psychological comfort. Following a consideration of the major philosophical approaches, this researcher holds constructionist-interpretivist beliefs, and subsequently accepting this stance for researching comfort in the home. Thus, subjects understanding of comfort in the home will be considered as their interpretation of the world in which they exist.
3.2 Theoretical Perspectives

This section addresses the theoretical perspectives suitable for this inquiry. The chosen theoretical approach will build upon the philosophical beliefs previously outlined as a constructivist-interpretivist philosophical stance. The aim of this research is to explore a holistic notion of comfort from the perspective of householders thus the theoretical approach must enable this to be achieved.

Even at this point, it is notable that this research is taking a different approach compared to typical research approaches in the field of comfort. Current research follows a natural science approach where scientific language aims towards neutrality. Research which follows scientific approaches look towards generalising, controlling and predicting, seeing human being as objects does not account for the interpretive process; in which human being understand the world around them. For instance, rating scales to record psychological responses, for example, the Bedford scale to record thermal sensations are common practice to understanding occupant thermal satisfaction (Benner 1994b).

3.2.1 Ethnography

Ethnographic studies focus on capturing the social and cultural meaning of everyday activities. This research approach originates from western anthropology, where descriptive narratives were gained from researchers exploring unfamiliar communities and cultures usually outside the Western culture (Hammersley & Atkinson 2007). Ethnography is defined by Brewer as follows:

“Ethnography is the study of people in naturally occurring settings or ‘fields’ by methods of data collection which capture their social meanings and ordinary activities, involving the researcher participating directly in the setting, if not also the activities, in order to collect data in a systematic manner but without meaning being imposed on them externally.” (Brewer 2000, p.6)

The application of ethnography within social research commonly happens at two levels, Brewer (2000) describes this as ‘big’ and ‘little’ ethnography. Firstly, ‘ethnography as qualitative method’ which requires ‘doing ethnography’ from
research objectives to reporting data collected thus maintaining focus on the cultural interpretation of the chosen phenomenon at every stage. Secondly, ‘ethnography as fieldwork’, can be described as the process of conducting qualitative research in an ethnographic way using unstructured, flexible and open-ended studies (Wolcott 1990; Brewer 2000).

A key feature of ethnographic research is to conduct an in depth rather than broad coverage of the subject in question, this is achieved by studying the subject in everyday context. Data is typically collected through multiple qualitative methods commonly interviews and participant observations; leading to a majority of data collected being unstructured in nature. The data is analysed by interpreting the cultural meaning of the actions of participants within context. Samples are usually smaller than fixed designed research due to the in depth nature of ethnographic studies (Hammersley & Atkinson 2007).

3.2.2 Phenomenology

The phenomenological approach is the study of human experiences; the aim of the research approach is to understand the phenomenon in question. Founded by philosopher and mathematician Edmund Husserl in the early 1900s, the philosophy of phenomenology is based on two key insights. Firstly, the human experience is an understandable experience, “it makes sense to those who live it” (Dukes 1984, p.198) and therefore can be interpreted by outsiders. Secondly, the experience is based on some form of logic or sense, the actions have meaning to the individual and this meaning is to be understood from their perspective. The are several variants of phenomenology existential phenomenology, naturalistic phenomenology, and realistic phenomenology just to name a few; however there are two phenomenological approaches which lead a majority of phenomenological investigations these are descriptive (also known as transcendental constitutive) and interpretive (also known as hermeneutic) phenomenology. The descriptive phenomenological approach was developed by Husserl and is the study of the phenomenon as it exists in pure consciousness. It approaches the phenomenon free from pre-conceived ideas and questions the researcher may hold, and
separates the phenomenon from the world in which it exists, While hermeneutic (interpretive) phenomenology is concerned with interpreting the various dimensions of the phenomenon from the perspective of the subject and within the context in which it is lived (Benner 1994a; Maggs-Rapport 2000; Wojnar & Swanson 2007). Both approaches are focused on understanding the human experience and therefore are suitable to holistic inquiries. However there are key differences between the two approaches whilst the descriptive phenomenology attempts to isolate the lived experience from the setting, interpretive phenomenology understands the phenomenon in context (Wojnar & Swanson 2007). A descriptive approach pursues a researcher-free understanding of the phenomenon, while an interpretive approach recognises the researcher and participant co-create an interpretation of the phenomenon. Over the development and practice of phenomenological research both descriptive and interpretive approaches have received criticism, notably in reference to the role of the researcher.

The process of isolating pre-conceived ideas or knowledge of the topic, remaining objective throughout is known as bracketing, and is a key feature of the Husserl’s development of the descriptive approach. The purpose of bracketing was to temporarily suspend pre-conceived beliefs and understandings of the phenomenon in order to study a pure and clear notion of the phenomenon. It is thought the process of bracketing provides scientific rigor, adhering to more traditional scientific inquiries focused on objectivity and observing (LeVasseur 2003). However this has been strongly criticised by several philosophers as an unachievable position to place a researcher, Benner (1994a) states in support of interpretive phenomenology, that “the interpreter can never escape his or her own taken-for-granted background or stance that creates the possibility of an interpretive foreground.” (Benner 1994a, p.100). Additionally, within the wider scope of conducting fieldwork to explore an experience or phenomenon, Patton (2002) states objectivity “can limit one’s openness to, and understanding of, the very nature of what one is studying, especially when meaning-making and emotion are part of the phenomenon” (Patton 2002, p.48).
The interpretive inquiry accepts the co-creation of an interpretation of the phenomenon from the interaction between researcher and participant. In doing so, the researcher presents their own assumptions of the phenomenon prior to conducting the research, and reflects on their role throughout the research. It is this continual awareness of the contextual criteria which results in trustworthiness of the participant-researcher interpretation (Wojnar & Swanson 2007).

3.2.3 Theoretical Approach

Interpretive phenomenology and ethnography share a focus; both approaches to research focus on the human experience and interpreting the cultural meaning behind a specific phenomenon. Whilst phenomenology focuses on interpreting the meaning and understanding of the experience of comfort from the perspective of the householder; an ethnographic approach would explore the phenomenon within the natural setting of people’s every lives. Both approaches are suitable to the aims of this research. However the nature of a phenomenological inquiry can also include observing the phenomenon in context, if the focus of this research is to understand the experience of comfort, phenomenology allows for the in-depth examination of all aspects of the experience. Due to the focus of this research on understanding the context (home) in which the phenomenon (comfort) takes place, an interpretive phenomenological approach was deemed more suitable than a descriptive approach. This methodological approach is fitting to the researcher’s constructionist-interpretivist philosophical stance previously outlined and also accepts the co-creation of an interpretation of the phenomenon through researcher and participants interactions.

3.3 Methodological Approach

This section will clarify the chosen methodology for this research which directly stems from the interpretive phenomenological theoretical approach and philosophical beliefs previously outlined.
3.3.1 Interpretive Phenomenology Approach

Husserl's development of phenomenology was modified and critiqued by several of his successors, one of which was his former student Martin Heidegger. Heidegger's contribution to phenomenology was that he believed the human had their own interpretation of the world around them and unlike Husserl's descriptive phenomenology he considered the socio-cultural context of the phenomenon to be of great significance.

Ontological Standpoint

Key to Heideggerian phenomenology was the understanding of the person, he stressed the significance of questioning the ontological view of the person, in particular what it means to be and how people make sense of the world around them. While in line with relativism standpoint outlined previously, at this point it is worth clarifying the key ontological principles behind Heideggerian interpretive phenomenology:

- **The person as having a world**
  
The term *world* is used by Heidegger to refer to the language, the social, the cultural and the historical practices in which a person exists. The relationship between the person and the world is significant to how it is interpreted by the person. It is this *world* in which the person is already situated; and therefore it is this *world* which shapes meaning.

- **The person as a being for whom things have significant and value**
  
Another key principle is having an understanding of how things have value and significance to persons living the experience. People attach feelings and emotions to the things they care about, against the socio-cultural and historical factors of the world they are situated within. Therefore the link between the value of things and the context in the person lived experience is significant to the study of the phenomenon; changes to context can potentially change the value of things.

- **The person as self-interpreting**
People will have their own interpretation of things in the world of which they belong. Heidegger believed individual interpretations were products of socio-cultural and historical background of their world rather than purely based on the interactions between subjects and objects. Heidegger considered these key perspectives on what it means to be as fundamental to an interpretive phenomenological inquiry (Leonard 1994).

*Interpretive Inquiries*

There are three major aspects to consider in conducting an interpretive inquiry, these are: (i) the forestructure, (ii) hermeneutic circle of understanding and (iii) modes of involvement. Everyday interpretations take place against a background of understanding known as forestructure. Forestructure refers to a person’s familiarity, background knowledge and expectations of the situation being interpreted. The significance of forestructure within an interpretive inquiry relates both to participant and interpreter; the interpreter states their own background understanding, and preconceptions of the phenomenon prior to the investigation adding trustworthiness to the inquiry. Understanding of our world is partly due to the familiarity of the culture around us. It is possible for persons to become so familiar with the world in which they conduct everyday activities that they overlook certain taken-for-granted aspects of the experience. For that reason the interpreter may choose to bring forward and outline the forestructure of understanding for the participant prior to the study (Plager 1994).

Hermeneutic circle of understanding is at the centre of the interpretation process. Our interpretations are based on background understanding (personal, cultural and historical aspects of our world) and shared human experiences. Our understanding lets us conduct everyday activities; these activities have meaning because we interpret them to be significant. Therefore our understanding shapes our interpretations, Heidegger states that human beings were constantly within a circle of understanding (Plager 1994; Wojnar & Swanson 2007).

According to Heidegger, within everyday life people may find themselves engaging in different modes of involvement. Typically interpretive phenomenological
research focuses on ready-to-hand and unready-to-hand experiences. In ready-to-hand modes of engagement individuals conduct activities with ease and things run smoothly; it is also stated of Heidegger’s perspective of this particular mode of engagement that ‘the person is involved in an absorbed manner so that the equipment is for the most part unnoticed’ (Plager 1994, p.73), which again stresses the taken-for-granted nature of several of our everyday lived experiences and experiences of this nature tend to be the focus of a majority of interpretive phenomenological research. Unready-to-hand modes of engagement refer to instances when activities which typically run smoothly, suffer unexpected and unfamiliar obstacles and are sometime the focus of phenomenological inquiries. In terms of this research into comfort and how it is experience within the everyday lives of householders, this would be defined as ready-to-hand modes of involvement.

Heidegger’s interpretive phenomenological approach can be summarised by the following key assumptions on the relationship between humans and the world around them, and also the nature of interpretive inquiry as detailed by Plager (1994, p.71):

- Human beings are social, dialogical beings.
- Understanding is always before us in the several background practices; it is in the human community of societies and cultures, in the language, in our skills and activities, and in our intersubjective and common meanings.
- We are always already in a hermeneutic circle of understanding.
- Interpretation presupposes a shared understanding and therefore has a three-fold forestructure of understanding.
- Interpretation involves the interpreter and the interpreted in a dialogical relationship.

Typically before an interpretative inquiry the researcher makes their assumptions and their understanding of the phenomenon in question known; this should be revisited throughout the inquiry adding to clarity and subsequently the credibility of the research. The line of interpretive inquiries should allow for openness
between interpreter and the participant, it should also be open to modifications if new avenues present themselves during the process of data collection.

The forestructure, hermeneutic circle of understanding and modes of involvement have been identified as key aspects of a the interpretive process. It is important to understand that comfort is understood and influenced by multiple aspects of one's everyday life for example social norms, their expectation of comfort based on previous experiences, and their interactions with others. The way in which comfort is interpreted by individuals and its significance to each person will be shaped by these multiple factors and are therefore significant to the investigators interpretation of the participants’ notion of comfort.

Data Collection and Analysis

A phenomenological approach collects descriptive data on participants’ experience of the studied phenomenon. As assumptions of Heidegger’s interpretive approach suggest the process of conducting an interpretive phenomenological study should involve one-to-one interactions between the researcher and the participant; there is strong emphasis on listening and creating a dialogue with the participant (Dukes 1984; Leonard 1994; Wojnar & Swanson 2007). Typical methods in for this type of approach include unstructured interviews, diaries and participant observational techniques; as a result, the data collected forms the narrative text which may consist of transcripts, photographs and videos. The researcher must become familiar with the text and understand the participant’s language in order to interpret the lived experience as clearly as possible. Approaches to the interpretive analysis process vary, in larger projects an interpretive team may conduct this process comparing interpretive accounts within-group. Alternative approaches to interpretive analytical processes can be conducted by one researcher, Benner offers three ‘narrative strategies’ these are paradigm cases, thematic analysis and exemplars all of which aim to expose the understanding of the lived experience from narrative accounts through indirect discourse (Benner 1994b). Approaches to data analysis will be discussed further in the Methodology chapter.
3.3.2 User-Centred Approach

There is a need for a user centred approach to domestic comfort, as was outlined in the introduction for this research. Derived from user centred design principles, it is difficult to find one universally accepted premise of the user centred approach as it can be applied to a wide scope of areas in research and development. Gould and Lewis (1985) outlined three key UCD principles which are widely accepted, these were:

- Early focus on user and tasks
- Empirical measurement
- Iterative design

This research is concerned with the first UCD principle; Preece, Rogers and Sharp (2002) expanded further on this providing the following five principles:

- User's tasks and goals are the driving force behind the development.
- User’s behaviour and context of use are studied and the system is designed to support them.
- Users’ characteristics are captured and designed for.
- Users are consulted throughout development from earliest phases to the latest and their input is seriously taken into account.
- All design decisions are taken within the context of the users, their work, and their environment.

The above principles further emphasise the need to understand the user, task and environment. A user centred approach acknowledges the significance of the task environment (in this case the home environment) to influencing how users behave. It is a widely accepted view that the UCD process should involve user participation, Gould and Lewis (1985) suggest direct contact using methods such as interviews and participant observations in order to understand the user and task.

It is clear from these five principles that a user centred approach is not dissimilar to the interpretive phenomenological approach; both approaches strive to understand the human experience, but the former could be said to lean towards understanding users’ behaviour whilst the latter seeks to understand the meaning.
of the phenomenon. The phenomenological approach stresses that the lived experience takes place within a context which cannot be ignored if the phenomenon is to be fully understood; this is also fundamental to the user centred approach to design. The same methods and techniques are suitable for both approaches, which focus on direct contact with users. User centred approaches in design seek to understand the perspective of the user in order to ensure a user focus throughout the design process. It is necessary for the researcher to interpret the users’ narrative and is the same process which is necessary for interpretive phenomenological research.

For this research, a combined user centred and interpretive phenomenological strategy/approach is deemed most appropriate to meet the aims and objectives of this research. The interpretive phenomenological strategy to this research offers an understanding of how people interpret the world around them and provides a strategy for the researcher to interpret the lived experience through a ‘shared lens’ with the participant. By applying user centred principles it will enable the research to maintain a focus on householders’ behaviour and perspectives within the context of the home whilst exploring a holistic notion of comfort. Adaptive thermal comfort acknowledges that there are several factors which impact on user thermal comfort experiences and expectations, however rarely are these factors explored holistically; this research intends to do this and by combining a user centred approach with an interpretive phenomenological approach. The focus will be on the users’ (householders) behaviour and perspectives in respect to the phenomenon in question, domestic comfort.

3.3.3 Researcher’s Voice

The interpretive approach draws attention to the significance of acknowledging the researcher’s forestructure of understanding in respect to background knowledge and expectations. This is known as being critically reflexive and is typical of social research, by doing so, the researcher recognizes that they are not a neutral observer; they play an active role in interpreting the data and as a result contribute to the credibility of the research process. Reflexivity commonly takes
place on two levels, (i) epistemological reflexivity, which is when the researcher shares their understanding of the nature of knowledge and (ii) personal reflexivity, which is when a researcher shares their values and aims which shape the research project (Wojnar & Swanson 2007). This section will provide the reflexive voice of the researcher in this inquiry.

3.3.4 Epistemological reflexivity

This chapter has been dedicated to clearly defining the theoretical standpoint for this research; the following diagram illustrates the chosen research paradigm:

![Research Paradigm Diagram]

Based on the research paradigm the following key assumptions can be made:

- The social world is a constructed reality in one’s consciousness.
- The person belongs to their own world in which the things around them have significance and value.
- The person’s interpretation of their world is influenced by socio-cultural and historical factors.
- The world of the participant can never be entirely captured.
Both participant and researcher bring a forestructure of understanding of the phenomena to the inquiry. In practice, the research paradigm will require multiple interactions between the participants and investigator, some of which will include a dialogical relationship for instance in the form of interviews. The nature of comfort in everyday life can be considered to be a ready-to-hand mode of involvement, meaning householders’ engagement in comfort may be so embedded within their world that certain aspects may go unnoticed. Baring this in mind, at points during this inquiry, the investigator may need to bring forward certain aspects of the notion of comfort for discussion and further exploration, and therefore allowing aspects of the forestructure to shape the inquiry. The role of the investigator throughout the multiple interactions with participants must continually acknowledge their own understanding of the phenomena and their influence within the interpretative process; this will ensure the notion of comfort is as close to the participants’ interpretation as possible and subsequently aid in the trustworthiness of the findings.

### 3.3.5 Personal reflexivity

Prior to determining the focus of this research, the researcher familiarised herself with the topic of domestic energy use and comfort, it was through an extensive review of the literature that she was able to identify the gap in the knowledge. The contribution this research intends to make has been argued in the literature review through outlining current research which is predominantly concerned with physiological thermal comfort and the acknowledgment of psychological and socio-cultural factors which may affect occupants’ satisfaction with the thermal environment but are rarely explored. The purpose of this research is to explore a holistic notion of comfort from the perspective of the householder and in the context of the home environment. It is anticipated that this research will uncover a wide range of factors associated with householders’ comfort which may not be typically associated with common definitions. It is also expected that there is unlikely to be the predominant focus on thermal comfort from the householders’
perspective when given the opportunity to share their understanding of the phenomenon. These expectations are partially as a result of the extensive literature review but are also as a result of the researchers’ background. The researcher has a user centred perspective with a background which scopes human factors and psychology. It is accepted that the researcher’s background has determined her aims and objectives of this research, which set out to explore the psychological aspects of comfort.
Chapter 1: Introduction

Chapter 2: Literature Review

Chapter 3: Research Paradigm

Chapter 4: Methodology

Chapter 5: Exploring Householders’ Perspective of Comfort in the Home

Chapter 6: Household Profiles

Chapter 7: Insights into Comfort and Daily Routines

Chapter 8: Exploring Psychological Dimensions of Comfort in the Home

Chapter 9: Capturing Comfort in Context

Chapter 10: Discussion: A Classification of Domestic Comfort

Chapter 11: Conclusions and Future Work

Chapter 12: References

Chapter 13: Appendices
4 Methodology

In the previous chapter the chosen philosophical stance and methodological approach has been outlined. This research methodology blends both a user-centred and interpretive phenomenological approach to conduct this inquiry into comfort in the home. This section will expand further upon the approach to this research, outlining the research purpose, design, further details of the research strategy and data collection methods.

4.1 Research Purpose

Determining the purpose of the research is significant in shaping the research methodology and subsequently the outcome of the research. Three classifications of the research purpose can be outlined; these are exploratory, descriptive and explanatory. Research with an exploratory purpose typically investigates a topic where little is known in order to gain further insights into the phenomenon. The findings of this type of research usually provide the foundation for hypothesis for future work. Research in this area usually follows a flexible design. Research which holds a descriptive purpose aims to gain extensive knowledge of a person, event or situation. Research can be of flexible or fixed design. Finally, an explanatory purpose can be chosen to provide an explanation and/or identify connections between different elements of a particular phenomenon or problem. Research with this purpose again can take on a flexible or fixed design.

It is possible for research to share more than one of the research purposes, depending on the scale of the research project, different stages of research can address research questions in each of the three fields. Given this research aims to explore the phenomena of domestic comfort, in particular the lesser known dimensions, and to also develop a classification of domestic comfort, the research purpose is both exploratory and explanatory in nature.
4.2 Research Design

The research design is vital for types of research, it is described as “the strategic plan of the project that sets out the broad structure of the research” (Brewer 2000, p.57). At a broad level, research designs belong to one of two branches, either fixed or flexible design.

Fixed research design is typically theory-driven using quantitative data collection methods such as experiments, surveys and questionnaires. The design is pre-specified, the variables to be studied are known in advance and the procedures and techniques are predetermined. Data analysis from fixed designed research groups the subjects rather than considering them as individuals therefore is not a chosen design approach to study individual behaviour. There are no set guidelines for sample sizes, however as some statistical tests require a minimum sample number, this needs to be considered in the design of the research (Robson 2002).

Flexible research design, as the name implies, can take many different forms. It is quite acceptable for the design to include a mix of both qualitative and quantitative research procedures. Unlike fixed design, all aspects of the research design are not necessarily predetermined, research can evolve and strategies may change over the course of the research. Methods are used to explore a particular issue or phenomenon in detail. Typically multiple data collection techniques are used to ensure the data collected are robust. Unlike fixed design, flexible design research has the capability of exploring individual’s behaviour and is more likely to explore a topic in depth with one subject’s perspective. There are several traditional flexible research designs which can be undertaken, for instance using case studies, ethnography theory, grounded theory, and phenomenological research (Robson 2002).

The research design has already been somewhat addressed within the research paradigm chapter, and as the aim of this research is to thoroughly explore the multiple dimensions of domestic comfort, capturing the householder’s experience of this intimate and subjective topic, a flexible design consisting mainly of qualitative procedures was considered the most suitable approach.
4.3 Research Strategy

In the research paradigm chapter the research paradigm of this inquiry was defined which described the chosen methodological approach. The methodology for this research will blend a user-centred and an interpretive phenomenological approach, which are derivative of the philosophical beliefs of the researcher and the theoretical perspective suitable for this inquiry; this was illustrated by the following figure:

It is rare for qualitative research to use only one method to gather information, usually a combination of methods or even methodologies are used to explore the facets of the phenomenon, so that their results can be compared; this is known as triangulation. Traditionally, triangulation was used to maintain a strong relationship between the analysis and the real world, however in research today, triangulation is considered to promote “the validity of data findings by allowing the researcher to explore a phenomenon more fully whilst facilitating a variety of methods to encourage comprehensive understanding and explanation” (Maggs-Rapport 2000, p.222). There are four basic forms of triangulation; data triangulation (the combination of data collection methods), investigator
triangulation (more than one researcher), theory triangulation (combining research perspectives in the examination of one set of data) and methodological triangulation (using multiple methods to consider one research problem) (Janesick 2000). The use of triangulation can effectively reduce threats of researcher and respondent bias and eliminate threats to validity (Robson 2002).

This approach will require a substantial amount of interaction with participants and multiple methods to collect the necessary details of the experience, therefore both data triangulation and methodological triangulation will be used. Given the multifaceted and complex nature of comfort, crystallisation as described by Richardson (2000) is strongly appropriate for this research.

4.4 Data Collection Techniques and Tools

4.4.1 Interviews

Interviewing is a common technique used within qualitative research which allows the researcher to explore people lives from facts, behaviour, beliefs and attitudes, giving a greater picture of the particular phenomena in question. Interviewing techniques follow one of the three styles, fully structured, semi-structured and unstructured. Fully structured interviews follow a fixed format only distinguishable from questionnaires or surveys by the use of open-ended questions. Semi-structured interviews suit the flexible nature of qualitative research in which they are based on predetermined questions, however questions may be omitted or added if appropriate. Unstructured interviews are where interviewees may be questioned in regards to areas of interest without specific questions being determined (Fontana & Frey 2000). A researcher’s choice of interview style method depends on the purpose of the study, the depth of information desired from respondents and the type of data analysis to be conducted.

While structured interviews are usually appropriate for fixed design research studies, this technique can also be used within flexible design research. Consisting of both closed and open-ended questions, the technique requires the researcher to
have a ‘balanced rapport’ with participants by being direct and structured with questioning but also remaining friendly. It is a key factor of structured interviews for the interviewer to marginalise their impact on the interviewee and their subsequent responses. It is a beneficial technique to be used alongside other methods and is particularly suited if the data are to be coded within predetermined categories.

Providing the middle ground between the two extremes of structured and unstructured techniques, semi-structured interviews are the common choice for qualitative researchers. This technique gives the interviewer the flexibility in order of topics and questions, they may have a list of predetermined questions but the interviewer has the freedom to change the wording to suit the rapport of the interview.

Unstructured interview techniques suits phenomenological studies due to the in-depth nature of the process. Based purely on open-ended questions or topic areas, this technique can be challenging for inexperienced interviewers due to the importance placed on gaining an intimate rapport with respondents. Unlike structured interviews, the data produced are unlikely to be easily coded or categorised. However it can potentially produce rich and complex data difficult to obtain otherwise (Fontana & Frey 2000; Robson 2002; Strauss & Corbin 2008).

The common motives for using the interview method were identified by Robson (2002, p.271), which stated the following:

- Where a study focuses on the meaning of particular phenomena to the participants.
- Where individual perceptions of processes are within a social unit.
- Where individual historical accounts are required of how a particular phenomenon developed.
- Where exploratory work is required before a quantitative study can be carried out.
Where a quantitative study has been carried out, and qualitative data are required to validate particular measures or to clarify and illustrate the meaning of the findings.

The use of face-to-face interviews allows for flexibility in design, to gathering of rich data and the possibility of gaining further information through non-verbal cues. However the method also lacks standardisation, can be time-consuming and potentially costly. The versatility of the interview technique can be a hindrance to the reliability of the data collected, however structured interviews are less likely to suffer from this issue. Reliability of semi-structured and unstructured interviews may depend more on the researchers skills and experience with the technique.

The choice of location can facilitate to the interview process. Using the home as a location for interviewing can provide the opportunity to embellish the richness of the data collected, the space is personal and integral to aim of the interview, thus its surroundings may bear beneficial for participant-researcher interactions, enhancing the rapport (Elwood & Martin 2000; Herzog 2005).

4.4.2 Focus groups

The basic premise of focus groups involves an interviewer/facilitator and a number of participants who are interviewed simultaneously. The focus group technique is classified a type of group interview and so can follow similar structures to the interviewing processes described in the above section (unstructured/structured). The main advantages to the focus group (or group interviews) over individual interviews are their flexible nature, usually being inexpensive to run and can involve the use of creative tools in order to gain richer data. The method is very versatile, which encourages its use in various disciplines and research purposes. In marketing research, it may be used to gain consumer feedback on products; in design, focus groups may be used to generate ideas for future development; within human factors research, the technique may be used to explore the usability of products (Langford & McDonagh 2003).
Focus groups within qualitative research are usually conducted for exploratory purposes with a structured nature; the interviewer/facilitator has topics and questions predetermined for the group. As well as asking the questions, the facilitator’s role is to keep the discussion focused. Progressing forward through the session, it is key that the facilitator maintains a balance between the passive and active nature of the role, as there may be occasions where the facilitator may need to encourage participants to express their views (Robson 2002; Fontana & Frey 2000). Usually focus groups are run with between six and twelve participants. In discussion of best practices for focus groups, Freeman states this size “is small enough for everyone to contribute, yet large enough to share diverse opinions across the whole group rather than fragmenting into smaller parallel discussions” (Freeman 2006, p.492). Focus group sessions should run for between 1 and 2 hours to give enough time for all participants to contribute and for topics to be exhausted (Freeman 2006; Robson 2002). Often the addition of focus group tools are used to enhance the discussion and to keep participants engaged in the session. Tools can be introduced for a number of reasons to immerse participants in the topic, to encourage the generation of ideas, to analyse a specific problem or for evaluative purposes; the interactions and outcomes of using certain tools become part of the data collected.

In this explorative style of this research immersive or warm-up tools are appropriate for use; these types of activities can help to introduce participants into a topic area and ensure that they are fully engaged. Table 2 shows an overview of some common focus group tools used to immerse participants into the session.

Table 2: Immersive Focus Group Tools

<table>
<thead>
<tr>
<th>Focus Group Tool and Description</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
</table>
| **Bring an Object**             | Minimal pre-session work required  
Participants’ bring an item along which represents or connects to the topic of the session. This tool can provide a valuable insight into the life of participants. | Participants may be reluctant to share personal objects with the group especially within focus groups are strangers |

Great for gaining a deep insight into emotions and opinions.
‘Day-in-the-life’ Exercise

To outline a typical day or a particular part of it which is significant to the topic of the focus group. This activity takes place solely in the focus group so will required quiet thinking time. Participants can then explain their experience and their emotions and feelings attached to their everyday activities.

A quick and easy activity
Stimulus for discussion and probing
The information is not always accurate
Participants may omit details they do not wish to share or feel are irrelevant

Word Map

Participants place single words on a board which are linked to the focus group topic. In the second round participants place words which are linked to one of the words already placed on the board.

Creates a common understanding of the topic area
No pre-work required
Time-consuming
Participants may feel pressured to partake

Adapted from (Langford & McDonagh 2003)

Used correctly, these techniques can be an enjoyable experience for the participants, as well as providing rich data for the researcher. The use of focus groups can be beneficial to encourage simulating conversations and provide the participants with a collective understanding of a particular topic, especially if this topic is not a subject which is easily accessible. However it is worth noting a collective understanding may supress the individual opinions of participants, a generalisation could potentially impact on the quality of the data collected.

4.4.3 Photo Elicitation

Photo Elicitation is simply defined by Harper (2002) as the "... idea of inserting a photograph into a research interview" (2002, p.13). By combining the use of image and words during interviews, the mind is stimulated to “evoke deeper elements of human consciousness” (Harper 2002, p.13). This technique has been used across disciplines within qualitative research: anthropologists have used the technique to capture images depicting people, objects and artefacts in the development of visual account of socio-cultural matters; at the other end of the scale, the method can be used to capture intimate and personal images of the home, family life and
the self, a sociologist’s use of this method. Using the photo elicitation method can aid in the recollection process encouraging rich multi-dimensioned responses and consequently strengthening the data collected.

In traditional methods of photo elicitation, the researcher either takes the photographs or provides images captured professionally which illustrate the areas of interest, the image or images are shown to respondents during the interview process to focus their responses. The interview will provide the opportunity to develop a collective interpretation of the image, this can help reduce the chances of misunderstandings between photographer and viewer. In more recent years, researchers have used participant produced photographs with the photo elicitation method; this move is in parallel with the increase in camera ownership and inevitable transformation of the photographer from the artist to the hobbyists to the ordinary person (Cronin 1998). In this form of photo elicitation, participants are asked to capture images themselves; at the interview stage, the participants has the opportunity to reflect on the image and some form of narrative adding a context and meaning to their own images. In some uses of this technique, written narrative is also provided with the photos and spoken interview to form a rich collective set of data around one single image. Harper notes that this particular technique of photo elicitation shows participants can learn to record their social world through visual-text narratives, through a combination of self-interviewing and traditional photoelicitation, this method is referred to as photo-essays. The process of capturing, reflecting and giving meaning to the self-produced images adds multiple layers of response, consequently strengthening the reliability of the data and reducing the risk of misinterpretation by the researcher (Harper 1998; Sampson-Cordle 2001; Harper 2002; Croghan et al. 2008).

4.4.4 Participant Observational Techniques

Participant observation techniques are deeply rooted in ethnography. Techniques of participant observation are typically employed for two main reasons: to explore a world from the perspectives of the participants and to observe the daily lives of participants in their natural setting. Traditional observations methods involve the
presence of an observer, either in a covert or overt role, recording and also sharing in the experience of participants’ everyday lives in an attempt to understand the social, cultural and psychological meanings of their activities (Brewer 2000).

The following sections describe two participant observation tools which are less traditional these are SenseCams, a wearable camera used to record images, and self-completion diaries for participants to write down their own activities.

4.4.4.1 **SenseCam: a Recognition Tool**

In the last decade, alongside the advances in wearable computing, there has been an increase in the use of wearable cameras as a data collection tool in multi-disciplinary research. The Vicon Revue is a small, 3 mega pixel camera, with a fish eye lens, worn around the neck which automatically takes a photo every 20 seconds (Figure 7) The device was developed by Microsoft Research and is commonly referred to within research as a SenseCam; this name was coined by its developers because “two of the main components of its operation are SENSing its environment and using a built-in stills CAMera to record images” (Hodges et al. 2006, p.178; Microsoft Corporation n.d.)¹. The SenseCam was developed with the purpose of being unobtrusive and automatic so that the user would not need to remain conscious to its presence.

![Image](image.jpg)

Figure 7: Vicon Revue Camera (Microsoft Research)

¹ The Vicon Revue camera is the purchasable version of the SenseCam developed by Microsoft Research, it is commonly called a SenseCam within research. For consistency purposes in this research the Vicon Revue cameras used will be referred to as a SenseCam’s.
The SenseCam is a multi-purpose research tool, it has the ability to hold up to 3000 images and has a 24 hour battery life. Revue software is provided to assist in the management of the large number of images, the applications allows the sequential playback of the images at a high speed, almost like a video. This device is used commonly as a memory aid; its versatility has led to research interests in several areas including brain injury, dementia, memory, Lifelogging and human behaviour (Hodges et al. 2006; Nguyen et al. 2009; Eldridge et al. 1992; Kelly et al. 2011). Its multi-disciplinary use is in part due to its many components, within the ‘black box’, it also features a multi-axis accelerometer, temperature sensor, compass, infrared motion detector and light colour and intensity sensor, however these feature are not very easily accessible and require the necessary expertise to use them which is why the SenseCam is packaged prominently as a wearable camera.

It worth noting, novice research with this device so far has produced indication of the potential usefulness of the SenseCam as a research tool; however at this point there is not the historical evidence of use which other observational tools may have, such as shadowing. For this reason, recent research projects only across various disciplines using the SenseCam have been reviewed.

The developers of the SenseCam, Hodges et al. (2006), conducted a study to determine whether the SenseCam could be used as a recollection aid for a patient suffering from limbic encephalitis (inflammation of deep structures of the brain) which had caused significant memory problems, (the patient could only partially recall a significant event a few days afterwards and had no recollection of the event a week later). The research examined the patient’s ability to recall significant events using the images from the SenseCam. They focused on short-term (after a day), and long term (after a month) recall and also assessed recall using a written memory aid. The results were unprecedented; the patient could remember three times as much with the use of the SenseCam during the short term recall experiment, than without it. This high level of recollection was relatively maintained during the long term recall experiment. In contrast, the written diary study did not produce similar results, recall was limited in the short term experiment and the patient found it too time-consuming. This type of recollection
study on patients with memory loss may seem a long way away from this research into domestic comfort; however there are key factors which can be drawn from this study. Firstly, the patient found the SenseCam convenient, passive and unobtrusive to use. Secondly, the patient preferred the image cues and they were found to be much more effective than the more conventional memory aid of maintaining a thorough written diary. The use of the SenseCam produced instances of ‘remembering’ and learnt narrative or ‘knowing’ the difference between the two processes were indicated by the researchers, whom stated in references to the process of remembering:

“[The patient] said that seeing the beginning of a clip brought memories ‘flooding back’. Her descriptions of events demonstrated that she remembered the events themselves, rather than the SenseCam pictures alone. For example, she would remark that someone had been rude to her on a particular day, or that the food hadn’t tasted nice – clearly this information is being recalled from her own memory.”

The researchers were able to distinguish between this process and instances of learnt narrative or knowing, they stated:

“[The patient] was retelling facts or a narrative that she had learned rather than having a true re-collective experience.”

Several psychological theories in the field of recognition memory make the distinction between remembering and knowing of past experiences and events. The process of remembering requires retrieving specific knowledge about specific experiences, for instance a person may have a distinct memory of winning an award, and they may be able to retell the event as if they are reliving the experience in their mind. This type of memory is commonly referred to as an episodic memory; imagery plays a prominent role in re-experiences of these events. Knowing refers to non-specific events; there is no recollection, however a person knows that the event occurred based on their own activity patterns and habits. For example, a person knows they go to a yoga class every Wednesday but may not have any specific knowledge about the event; this is often referred to as semantic memory (Bodner & Lindsay 2003; Knowlton 1998; Sellen et al. 2007). Information
retrieved by remembering and/or knowing a process is obtained from the autobiographical memory knowledge base. Conway (2000) described this knowledge base as consisting of three hierarchical levels, each level encompasses the level below; firstly lifetime periods (i.e. getting married), secondly, general events (i.e. taking a vacation) and thirdly, event-specific knowledge (i.e. daily routines).

Access to this vast knowledge base is obtained when triggered by cues through everyday life. Cues usually stimulate one or more of our senses, for example a person could walk by a bakery and the smell of freshly baked bread may trigger their recollection of their mother baking bread in the kitchen when they were a child. The most common cues used by researchers are visual; they are found to be most effective especially with retrieving of event-specific knowledge. Research of this nature is typically found in the realms of neuropsychology, the studies tend to be impersonal and laboratory-based in contrast to real-world setting of this research (Eldridge et al. 1992; Rubin 2005; Sellen et al. 2007). However, a recent study into Sensecam use in human-computer interaction (HCI) research examined the use of lifelogging as an aid to remembering past events (Sellen et al, 2007).

With 19 student participants, they investigate whether SenseCam images helped remembering and knowing and whether the images could improve recollection of past events over varying time periods (3 days to 4 months). They found participants' recollection of the past events improved with the use of SenseCam. Participants could recognise their own Sensecam images from the control subject images and were able to order their own images up to 4 months after the day in question. The images acted as successful cues. Participants experienced true remembering of the events by viewing the images, however there could also be an element of knowing as participants have knowledge of the daily routines and are familiar with the place which they visit. The researchers found no evidence that the SenseCam images improved or worsened long term remembering or knowing but, in their opinion, remembering events were subjected to general forgetting, whilst knowing information is unlikely to degrade as quickly, as it is more likely to be activity pattern based. This suggests that SenseCam images can aid two types of memory
systems and should not be solely considered as a tool to trigger remembering, but also to aid in retrieving information which is known through routines (Sellen et al. 2007).

There is limited information about the use of SenseCams as an ethnographic tool, in fact most research using SenseCams produces quantitative data and, as previously stated, are typically conducted within laboratories. Byrne and his colleagues (2008) explored the possibilities of the SenseCam as an ethnographic tool. They noted the importance of its discreetness, unlike other observational methods such as shadowing participants; this could also reduce the amount of time and effort for the investigators conducting the research. Table 3 gives a summary of the advantages and disadvantages of using the SenseCam collated from the available literature (Byrne et al. 2008; Sellen et al. 2007; Kalnikaitė et al. 2010; Hodges et al. 2006; Kelly et al. 2011)

Table 3: Summary of Advantages and Disadvantages of Wearable Cameras as Observational Tools

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Captures behaviour in situ</td>
<td>Participants may feel under surveillance (especially after short-term use)</td>
</tr>
<tr>
<td>Captures detail visual information</td>
<td>Angle of camera may miss vital actions (i.e. telephone use)</td>
</tr>
<tr>
<td>When used with recollection interview validates the visual data captured</td>
<td>Participants may forget they are wearing the SenseCam and unintentionally capturing private moments (long-term use).</td>
</tr>
<tr>
<td>Can be less obtrusive than traditional observational methods</td>
<td></td>
</tr>
</tbody>
</table>

4.4.4.2 Diary Studies

Diary techniques are commonly employed by social scientists to gain an insight into the behaviours and activities of people in context. The term diary used in this sense refers to “an annotated chronological record or log” (Zimmerman & Wieder 1977, p.481). This technique can be described as an observational tool as the data which are observed and recorded by the participant creates field notes similar to those using traditional observational methods. Although the technique can capture behaviour in situ, the consistency and quality of the data can vary as participants
are fully responsible for data collection. Timescale for keeping diaries vary, but participants are usually required to complete diaries within a specified time by the researcher. Table 4 gives a summary of the advantages and disadvantages of using the self-completion diary techniques (Robson 2002; Zimmerman & Wieder 1977; Obrist et al. 2008):

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Captures behaviour in situ</td>
<td>Pressure on the respondent to record their activities</td>
</tr>
<tr>
<td>Could potentially discover new insights through the perspective of the subject</td>
<td>Data record by participant could be misinterpreted by researcher</td>
</tr>
<tr>
<td>Unobtrusive technique</td>
<td>Inconsistency in quality</td>
</tr>
<tr>
<td>In-depth insight into routines and activities</td>
<td>The researcher lacks control over the data collection situation</td>
</tr>
</tbody>
</table>

4.4.5 **New Ecological Paradigm Scales**

The New Ecological Paradigm (NEP) scale is a revised version of the new environmental paradigm originally developed in mid-70's by Dunlap and Van Liere. It is a measure of pro-environmental beliefs, focused upon three factors; human's ability to affect the balance of nature, whether there are limits to the growth of human societies and our right to rule over nature. The NEP Scale consisted of 15 items using a 5 point Likert scale responses ranging from strongly disagree to strongly agree. Although, drawing upon three factors of environmental beliefs, the score from the scale can be treated as one dimension. Endorsements of the NEP scale have found well-educated, politically liberated young adults to higher pro-environmental scores than their counterparts (Dunlap et al. 2000; Dunlap & Van Liere 2008)

4.5 **Data Analysis**

Selecting the type of analysis to conduct is an important step in interpreting and reporting the data. In this section qualitative and statistical data analysis approaches will be discussed.
4.5.1 Qualitative Data Analysis Approaches

There are several ways to approach the analysis of qualitative data; a majority of approaches can typically be categorised under four main approaches: quasi-statistical methods, template approaches, editing approaches and immersion approaches. Quasi-statistical methods take a scientific approach and essentially consist of turning qualitative data into a quantitative format, commonly known as a content analysis. At the other end, immersion approaches take an unsystematised and unstructured approach to the analysis process; it relies heavily on the experience and creativity of the analysts. Taking a template approach consists of using predetermined categories to organise data, the approach is structured. An editing approach allows for the researcher to interpret the meaning of the data and develop codes from the prominent themes they identify, and is more flexible than the template approach.

The process of conducting an interpretive analysis requires the researcher to move back and forth between parts of the text and also to remember that the participants’ account of their world and their understanding of the participants’ world are different. Benner offers three ‘narrative strategies’ for conducting an interpretive analysis of narrative text; these were (i) selecting paradigm cases, (ii) conducting a thematic analysis and (iii) identifying exemplars. Given the aims of the research and the data collection techniques outlined for each study, quasi-statistical and immersion approaches were not considered appropriate for this research; the most appropriate data analysis approaches to achieve an in-depth analysis were thought to be template and editing approaches.

4.5.1.1 Thematic Analysis

Thematic analysis is defined as a method for “identifying, analysing and reporting patterns (themes) within data” (Braun & Clarke 2006, p.79). It is a common approach for interpreting data; the process allows the researcher to identify themes which are of concern to the research aims. Themes are typically developed from identifying codes these are described as ‘the most basic segment, or element, of the raw data or information that can be assessed in a meaningful way regarding
the phenomenon’ (Boyatzis 1998, p.63), the codes are then grouped under broader headings (themes). Braun and Clarke present a guide consisting of six phases for conducting a thorough thematic analysis; these are summarised in the Table 5:

Table 5: Guide to Conducting a Thematic Analysis

<table>
<thead>
<tr>
<th>6 Phases of Data Analysis</th>
<th>Summary of Phase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase 1: Familiarising yourself with your data</td>
<td>This step may also include transcribing the data. The researcher immerses themselves in the data through transcribing, reading, rereading and to get familiarised with the data.</td>
</tr>
<tr>
<td>Phase 2: Generating initial codes</td>
<td>Identifying key features in the data, for larger data sets typically qualitative data analysis software will be used for this task.</td>
</tr>
<tr>
<td>Phase 3: Searching for themes</td>
<td>The codes which have been developed are organised and combined under larger overarching themes.</td>
</tr>
<tr>
<td>Phase 4: Reviewing themes</td>
<td>The themes are refined to form an accurate representation of the findings. This may include linking data and removing codes.</td>
</tr>
<tr>
<td>Phase 5: Defining and naming themes</td>
<td>A further review of the identified themes is conducted to determine the scope of the theme headings.</td>
</tr>
<tr>
<td>Phase 6: Producing the report</td>
<td>This phase includes reporting the major themes and the overall findings of the research.</td>
</tr>
</tbody>
</table>

4.5.1.1.1 Template Analysis

Template analysis is a form of thematic coding which involves using predetermined themes to review the data. Data analysis is approached with an original template, during the reviewing process it is likely new and immersing themes and codes may be identified which also are of interest to the research aims leading to the insertion of new codes and the potentially changes in scope. The typical phases of conducting a template analysis are shown in Table 6 (Symon & Cassell 1998):
Table 6: Conducting a Template Analysis

<table>
<thead>
<tr>
<th>Stages</th>
<th>Summary of Phase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase 1: Creating Initial Template</td>
<td>The initial template can be created from a number of sources, interviews, literature, research questions, etc. The template created should be broad in order to allow for flexibility in coding data.</td>
</tr>
<tr>
<td>Phase 2: Revising the Template</td>
<td>This stage may include a number of possible actions, including insertion, deletion, changing scope and changing higher-order classifications.</td>
</tr>
<tr>
<td><strong>Insertion and Deletion</strong></td>
<td>The researcher identifies where data may be relevant to the research aims but does not fit in to the original template. Codes can be inserted typically at a high-level with new low-level codes. Deletion usually occurs at the end of the coding process, if codes from the original template were not used they can be deleted.</td>
</tr>
<tr>
<td><strong>Changing Scope</strong></td>
<td>The scope may change if issues are raised in the data which significant to the research aims but are not covered in the original template.</td>
</tr>
<tr>
<td><strong>Changing Higher-Order Classification</strong></td>
<td>After coding, the higher-order classification which was created as part of the original template may not be appropriate at that chosen level. High-order levels may be demoted to create new sub-categories.</td>
</tr>
<tr>
<td>Phase 3: The ‘Final’ Template</td>
<td>After the previous phases have been completed the final template will have been developed.</td>
</tr>
</tbody>
</table>

4.5.1.2 NVivo: Qualitative Data Analysis Software

A common technique for the aforementioned thematic analysis, is the process of coding data; typically some form of data analysis software is used to code and manage large data. Developed by QSR International, NVivo is common qualitative data analysis software which supports various ways of analysing. There are five key ways in which NVivo can support data analysis; firstly, managing data, data sources can take a number of different forms, transcripts, images, notes, etc., the can also be large and appear unmanageable; NVivo software can aid in organising the data.
Secondly, managing ideas, it can be used to provide and organise new concepts through coding. Thirdly, it can be used to ask questions of the data, queries can be run to identify points of interest to the researcher. Fourthly, it can provide graphical representations of the data, through features which allow the researcher to develop models and charts of the data. And finally, NVivo supports the reporting of findings through its ability to manage and analyse the date (Bazeley 2007).

For this research, NVivo will be used to organise and manage the data, and conduct the thematic analysis.

4.5.2 Quantitative Data Analysis

4.5.2.1 New Ecological Paradigm Scale

Due to the in-depth analysis of individual cases the sample size was kept small and the studies conducted in this research were not intended to be representative of the general population which inevitably limited the appropriate statistical test which could be used. Non-parametric test do not hold the assumption that the distribution of the population is normal, they tend to be considered less stringent but are more suitable for smaller sample sizes. The NEP scale uses a 5 point Likert scale, therefore the type of data it will produce will be ordinal. The following statistical tests were used, Mann-Whitney U Test, to compared NEP scores (continuous dependent variable) against gender (categorical independent variable). Spearman’s Rank Order Correlation (rho) to explore the relationship between NEP scores and age (two independent continuous variables).

4.6 Sampling Strategy

A number of different sample strategies exists to suit the needs of the research, these can be categorised as either probability or non-probability sampling strategies. Probability sampling allows statistical inferences to be made between the sample size and the population size. Non-probability sampling refers to using a sampling strategy where the proportion of sample to the general population is not known. The focus of this research is concerned with extensively exploring domestic
comfort; it was not feasible, considering the methodological approaches and the scale of the project, to use probability sampling, therefore all studies in this research used non-probability sampling (Robson 2002). Given the design of this research, purposive sampling strategy and snowballing strategy were considered most suitable. A purposive sampling strategy “focuses on selecting information-rich cases whose study will illuminate the questions under study” (Patton 2002, p.230). It requires the researcher to use their judgement in selecting participants appropriate for the research. A majority of qualitative research sampling contains an element of purposive sampling, including applying a snowball sampling strategy which begins by initially identifying participants through purposive sampling; they are then used as informants to identify further participants for the study (Coyne 1997; Robson 2002; Patton 2002).

Due to the in-depth inquiry and mixed method approach taken to explore the experience of domestic comfort the sample sizes were kept relatively small. This is typical of both interpretive phenomenological which commonly conduct intensive research with a small sample in order to fully understand the meaning of the phenomenon from the perspective of the participant (Maggs-Rapport 2000).

4.7 Validity of Research

Defining precisely what validity means for qualitative research has its difficulties due to the flexible and unstructured approach it can take, but by conducting good quality research, threats to the validity of the research can be reduced. Given the strategies set out for this research, the main threats are likely to be to the description and the interpretation of data collected. There are three main threats to validity: reactivity, researcher bias and respondent bias. Reactivity refers to the way in which the researcher’s presence may impact on the participant involved and consequently the data collected. Researcher bias is concerned with the pre-conceived ideas and background of the researcher which may impact on the way in which the research is viewed. And finally the respondent bias refers to the way in which the respondent may modify or withhold information for personal reasons or
in some cases attempt to adhere to being a ‘good participant’. In order to reduce these threats, three strategies were applied to this research:

- **Triangulation:** as discussed in the research strategy section, data triangulation and methodological triangulation was applied allowing for data to be cross-referenced; the use of multiple data collection methods and data sources reduces the threat of all three identified threats to validity.

- **Reflexivity:** as previously described in the research paradigm chapter the researchers’ foreground of understanding of the phenomenon in question should be acknowledged; in interpretive research this is addressed through the practice of being reflexive. Each study chapter will include a section labelled *reflections*, this will include a critique the methodology and a reflexive voice of the researcher. Reflexivity improves the trustworthiness and credibility of the findings (Benner 1994b).

- **Member checking:** a strategy which refers to the process of checking back with participants after data is collected and interpreted to verify the data has been interpreted correctly. This strategy was applied where appropriate during the research (Robson 2002).

### 4.8 Research Ethics

Ethics is a vital part of conducting participatory research with participants. Ethical approval protects research participants by providing confidentiality, anonymity and safety against harm during the research process. An ethics checklist was completed to verify good ethical practice was followed (Strauss & Corbin 2008). Participants were informed in advance of the requirements of each study and the use of the data they provided, and informed consent was gained in each case. The studies designed for this research included observational methods through recording participants in their home environment and the guidelines already established for conducting research in people’s homes were followed, this being *Generic Protocol Gog-P6: Unchaperoned home visits to collect mainly qualitative data*. It was not necessary to seek full approval from Loughborough University's Ethics Advisory
Committee as these established procedures covered all aspects of the research approach.
Chapter 1: Introduction

Chapter 2: Literature Review

Chapter 3: Research Paradigm

Chapter 4: Methodology

Chapter 5: Exploring Householders’ Perspective of Comfort in the Home

Chapter 6: Household Profiles

Chapter 7: Insights into Comfort and Daily Routines

Chapter 8: Exploring Psychological Dimensions of Comfort in the Home

Chapter 9: Capturing Comfort in Context

Chapter 10: Discussion: A Classification of Domestic Comfort

Chapter 11: Conclusions and Future Work

Chapter 12: References

Chapter 13: Appendices
5 Exploring Householders’ Perspective of Comfort in the Home

5.1 Introduction

As identified during the literature review domestic comfort research is dominated by a focus on energy consumption, such as space and water heating. There is a growing interest from researchers investigating thermal comfort in exploring the multidimensional nature of domestic comfort (Centnerová & Boerstra 2010; Cole et al. 2008). The categorisation of comfort has been sensory-driven and the approach usually involves considering dimensions in isolation of one another or a comparative examination of one or two dimensions (Moezzi & Lutzenhiser 2010). However the categorisations are not ones which householders would necessarily use to describe comfort in their home; the householder is likely to experience a collective sensory impression of the various dimensions of comfort. This study set out to explore the meaning and creation of comfort from the perspective of the householder.

5.2 Study Aims

This study was set out to address the following objective:

- Explore the range of dimensions of comfort in the home from the home from the perspectives of householders in a sample of UK homes.

The findings from this study contribute to the overall aim of this research to begin to classify domestic comfort.

5.3 Rationale

The literature review of domestic comfort research stressed the lack of empirical data supporting a wider notion of comfort in the home and minimal exploration of comfort from the perspectives of householders. Therefore the purpose of this study was to explore householders’ definition of domestic comfort in their own
words. This study also examined how comfort is achieved in the home environment. The findings from this helped to frame the dimensions of comfort in the home and address the following research question:

1) What are householder’s perceptions of the meaning of comfort in the home and how do they create their own comfort?

5.4 Methods

The study was conducted to explore the human experience of comfort. The methods for achieving this were required to provide participants’ the freedom to express their understanding of the phenomenon of comfort and to provide detailed responses. With this in mind, interviews were chosen as the most suitable technique. By primarily following an interpretive phenomenological approach the method allowed the topic of comfort to be explored without boundaries or distortion from the researchers’ pre-conceived ideas (Maggs-Rapport 2000). Face-to-face, semi-structured interviews with open-ended questions were the most appropriate technique to allow the flexibility required for respondents to express themselves. Further details of interview methods are outlined in section 4.4.1.

An opportunity arose to conduct this study alongside a large-scale research project. The CALEBRE (Consumer-Appealing Low Energy Technologies for Building Retrofitting) project was a four year project funded by EPSRC and E.ON. The main aim of the project was to find achievable and consumer acceptable solutions for reducing carbon emissions within domestic buildings. The research was also interested in understanding comfort within the home, which allowed this study to easily integrate into the wider focus of the project.

5.5 Sampling

A combination of purposive sampling strategy and snowballing strategy were used in the recruitment of participants which was conducted entirely by researchers on the CALEBRE project. The focus of the CALEBRE project meant the main criteria for participants selection was as follows:
- Property owner
- Resident of a property built pre-1930 with solid wall structure (i.e. no cavity wall).

Participants were rewarded with a £20 gift vouchers for taking part in the CALEBRE study, of which this study formed a part.

### 5.6 Piloting

A series of questions relating to domestic comfort were devised and incorporated into the main CALEBRE interview. A pilot was completed of the interview questions relevant for this research with three participants; no major changes were made to the design of the interview questions.

### 5.7 Design of Interview Questions

The broader interview was designed to cover the key areas of focus to the CALEBRE project; within this interview, questions on the topic of domestic comfort were included specifically for the purpose of this research. Questions were designed to explore the meaning of comfort to householders and how it is created. It was important at this stage to minimise the researchers’ influence of participants’ expressions of their understanding and experiences of comfort. Participants were aware the wider context of the CALEBRE project with its focus on elements of heating, therefore a probing question was added to extend the focus from thermal comfort to other aspects disconnected from the context of the project. The following open-ended questions were designed to achieve this goal:

- **Within your home, what does comfort mean to you?**

- **[Probing Question] Other than thermal comfort, what other attributes do you associate with comfort in your home?**

- **How do you create comfort in your home?**
5.8 Ethics

As stated in section 4.8, Loughborough University ethical guidelines were followed, an ethical checklist was completed, and full ethical approval was not required. As this study included off-campus interviews and circumstances where the investigator would be alone with participants; in these incidences precautionary guidelines provided by Loughborough University’s Ethical Advisory Committee were followed to ensure the safety of the investigator.

5.9 Equipment

All interviews were recorded using a Dictaphone; during the interview investigators took notes on key points made by participants.

5.10 Interview procedure

Once householders had confirmed their participation in the study, they were contacted to arrange a suitable date and time for an interview. Interviews were conducted in the homes of the participants; this was deemed the most appropriate place considering the focus of the interview (Elwood & Martin 2000; Herzog 2005). Prior to the start of the interview, participants had the time to read the information sheet, given the opportunity to ask questions and signed the consent forms. Interviews were conducted with the home owners and other household members, questions were asked to all householders present.

The section on comfort was integrated into the wider interview process; all householders had the opportunity to respond to the questions. Once the interview had finished, householders were given the £20 voucher for participating in the study. This researcher was present at some, but not all of the interviews, but data from the full set of participants was made available for analysis.

5.11 Data Analysis

Managing qualitative data can be difficult and messy if not organised and managed well. With this in mind, data analysis software NVivo was considered the best
approach to manage, code and to identify themes within the data (Braun & Clarke 2006; Bazeley 2007).

Recordings of the interview were transcribed by researchers on the CALEBRE project; the interview transcriptions were made available for this research. Analysis was conducted of two main areas firstly the meaning of comfort and secondly the creation of comfort. A thematic analysis was conducted following the phases of thematic analysis detailed in (see section 4.5.1.1). The researcher familiarised herself with the data and generated initial codes and themes solely through the data. However the four over-arching themes (i.e. environment and physical comfort) were shaped from terms commonly used within the literature surrounding the context of home (Sixsmith 1986; Smith 1994; Pineau 1982).

The following figure shows a branch of coding for the meaning of comfort.

![Figure 8: Excerpt of coding from NVivo](image)

### 5.12 Findings

This section presents the main findings of the study; following the description of the general household characteristics. The findings are presented within two main sections, firstly responses to the meaning of comfort, followed by the creation comfort.
5.12.1 Household Characteristics

Interviews were conducted with 35 participants, 20 females and 15 males; the following household information was collected. In all, 20 households took part in the study; the number of residents per home was on average 3 people ranging between 1 – 7 people. The income band mean was £40 – 50,000 ranging between <£10,000 - >£80,000.

On average, the number of adult (18+) householders per householder was 2 people, ranging from 1 – 5 people; the mean number of children was 1 ranging from 0-4 children. The mean age of adult householders was 48.2 years ranging between 18 – 80 years, whilst the mean age of children was 6.9 years ranging from 1-17 years. Participant information is shown in Table 7.

<table>
<thead>
<tr>
<th>Household</th>
<th>Participant Code</th>
<th>Gender</th>
<th>Age</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>C1P1</td>
<td>Male</td>
<td>65</td>
</tr>
<tr>
<td>1</td>
<td>C1P2</td>
<td>Female</td>
<td>62</td>
</tr>
<tr>
<td>2</td>
<td>C2P3</td>
<td>Male</td>
<td>43</td>
</tr>
<tr>
<td>2</td>
<td>C2P4</td>
<td>Female</td>
<td>40</td>
</tr>
<tr>
<td>3</td>
<td>C3P5</td>
<td>Female</td>
<td>50</td>
</tr>
<tr>
<td>3</td>
<td>C3P6</td>
<td>Male</td>
<td>50</td>
</tr>
<tr>
<td>4</td>
<td>C4P7</td>
<td>Male</td>
<td>52</td>
</tr>
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<td>45</td>
</tr>
<tr>
<td>5</td>
<td>C5P9</td>
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<td>70</td>
</tr>
<tr>
<td>6</td>
<td>C6P10</td>
<td>Female</td>
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</tr>
<tr>
<td>6</td>
<td>C6P11</td>
<td>Male</td>
<td>51</td>
</tr>
<tr>
<td>7</td>
<td>C7P12</td>
<td>Female</td>
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</tr>
<tr>
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<td>C7P13</td>
<td>Male</td>
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</tr>
<tr>
<td>8</td>
<td>C8P14</td>
<td>Male</td>
<td>50</td>
</tr>
<tr>
<td>8</td>
<td>C8P15</td>
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<td>15</td>
</tr>
<tr>
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</tr>
<tr>
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<td>56</td>
</tr>
<tr>
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<td>35</td>
</tr>
<tr>
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</tr>
<tr>
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<td>Male</td>
<td>57</td>
</tr>
<tr>
<td>11</td>
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<td>Female</td>
<td>54</td>
</tr>
<tr>
<td>12</td>
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<td>46</td>
</tr>
<tr>
<td>12</td>
<td>C12P22</td>
<td>Female</td>
<td>43</td>
</tr>
<tr>
<td>Household</td>
<td>Participant Code</td>
<td>Gender</td>
<td>Age</td>
</tr>
<tr>
<td>-----------</td>
<td>------------------</td>
<td>--------</td>
<td>-----</td>
</tr>
<tr>
<td>13</td>
<td>C13P23</td>
<td>Male</td>
<td>63</td>
</tr>
<tr>
<td>13</td>
<td>C13P24</td>
<td>Female</td>
<td>61</td>
</tr>
<tr>
<td>14</td>
<td>C14P25</td>
<td>Female</td>
<td>34</td>
</tr>
<tr>
<td>15</td>
<td>C15P26</td>
<td>Female</td>
<td></td>
</tr>
<tr>
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<td>C16P27</td>
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<td>29</td>
</tr>
<tr>
<td>16</td>
<td>C16P28</td>
<td>Female</td>
<td>28</td>
</tr>
<tr>
<td>17</td>
<td>C17P29</td>
<td>Female</td>
<td>51</td>
</tr>
<tr>
<td>18</td>
<td>C18P30</td>
<td>Male</td>
<td>45</td>
</tr>
<tr>
<td>18</td>
<td>C18P31</td>
<td>Female</td>
<td>44</td>
</tr>
<tr>
<td>19</td>
<td>C19P32</td>
<td>Female</td>
<td>46</td>
</tr>
<tr>
<td>20</td>
<td>C20P33</td>
<td>Male</td>
<td>80</td>
</tr>
</tbody>
</table>

To fulfil the criteria for the CALEBRE project all properties were built pre-1930 with solid wall structure, constructed between 1840 and 1930. The properties ranged from terraced to detached homes and average ownership was 16.6 years, ranging from 3 – 35 years.

5.12.2 The Meaning of Comfort

Participants identified several dimensions they personally associated with the meaning of comfort. The responses drew upon factors which were across a range of physical, visual surroundings, psychological and social aspects of their home life. Many participants responded by giving a combination of factors which encapsulated their meaning of comfort, for instance participant C7P12’s drew upon the order, cleanliness, food and warmth when describing their perspective of meaning. Also important to note from C7P12 response was how the lines were blurred between meaning of comfort and creating comfort, demonstrating how participants drew upon their own experiences and preferences to provide a meaning of comfort in their home:

*C7P12: “A bit tidy, a bit clean, food, a bit warm, TV. I don’t feel comfortable in the house if there’s nothing in tasty to eat.”*
On the other hand C3P6 was able to encapsulate the meaning of comfort in one statement focusing on its sub-conscious nature. Participant C3P6 stated:

\[
\text{C3P6: "I think trying to put it down to one statement it would be not being aware of your environment, having any kind of impact – you’re just living in."}
\]

The data map shown in Figure 9 shows the breadth of factors which participants associated with the meaning of comfort in their home. The findings will first explore the main (frequently discussed) themes which were the environment and physical comfort, aesthetics and perception of space and order and psychological wellbeing and interactions and activities.
Figure 9: Meaning of Comfort Data Map
5.12.2.1 The Environment and Physical Comfort

This section focuses on factors of the surrounding environment and those which contribute to householders’ physical and physiological comfort. Aspects of thermal comfort were the strongest themes and are presented below.

Thermal Comfort and Adaption

The temperature of the environment was referred to frequently by participants, with preferences for a warmer environment being the most frequent response. Nearly half of all participants’ (16 of 35 participants’) referred to warmth, although the majority of these respondents were female contributing to 11 of the overall responses, age did not appear to play a factor. The following selection of quotes demonstrated this perspective:

- C13P24: “It has to be warm though. I am a cold mortal; comfort to me is warmth, definitely.”

- C12P21: “To be warm enough, to...for it not to be draughty.”

- C5P9: “…being warm, or warm enough.”

The desire towards a warmer environment was also expressed by discussing an aversion towards feeling cold, noting that cold environments are uncomfortable or an obstacle to being comfortable, stating:

- C3P5: “To me it’s not being cold, if I’m cold I’m uncomfortable.”
Far fewer participants felt a sense of comfort was indicated by a cooler home. C1P1 (65 years old) drew upon his age as a reason to prefer a cooler temperature, whilst C8P14 expressed an expectation for changeable indoor temperatures throughout the varying weather conditions; expecting a warmer house when it is cold outside and a cooler house when it was warm outside rather than the same temperature all year round, as described by C8P14. Adaptive expectations were drawn upon further during the responses to questions on creating comfort in the home:

C1P1: “We tend to not like the house too hot; in fact the children would complain that it’s constantly too cold. I think that’s because of age and what you get used to, which is in fact the same as age.”

C8P14: “Warmth in the winter and the ability to keep it cool in the summer, in the high summer, if it’s too hot.”

Other aspects were also discussed responses were scattered across elements of environmental and physical comfort factors. This included factors such as air quality, managed through opening and closing windows, natural lighting and having a quiet environment.

5.12.2.2 Aesthetics and Perception of Space and Order

There were a number of factors which were identified in relation to comfort and aesthetics, and perceptions of the space and order of surrounding stimuli. The prominent themes were aesthetics, order, space and place, discussed further below.
Aesthetics and Personalisation

Participants noted the aesthetics of the surroundings, the décor, and the personalisation of different rooms in order to make spaces more appealing and comfortable to live in, as described by C5P9. She also noted the enjoyment of carrying out the personalisation of the bedrooms in her home:

C5P9: “Comfort is about the visual surroundings, that you sit in a room and think, this room is nice to be in for a start, obviously, having comfortable seating, having a décor that you yourself enjoy which is why I’ve enjoyed doing the bedrooms because they were not to my taste beforehand. So I’ve done what I want to do.”

C2P4: “... having nice things around you, nice pictures and things to look at...”

C1P1 also noted the different perspectives he and his wife shared on the meaning of comfort; whilst his wife (C1P2) attached the meaning of comfort to physical aspects he associated comfort with the aesthetics of the environment.

C1P1: “I think you’re physical and I’m aesthetic, you see.”

In terms of the appeal of the surrounding environment, several participants commented on the tidiness of their home, focusing on the impact of an untidy environment on their comfort. Clutter or a messy home was seen as an obstacle to experiencing comfort, C9P18 stated how comfort was restrained and stress was increased by an untidy home, whilst C16P27 discussed managing the untidiness, and how regularly used areas needed to be kept tidy whilst other spaces could be messier. The following discussion between husband and wife as illustrate this point:
Many participants connected space to the meaning of comfort; discussing a range of topics from space for activities, the layout of rooms and adaptable space. Additionally places for things such as storage or having certain belongings in a convenient place were also important to the meaning of comfort. The amount of space was not defined in terms of dimensions by most participants but rather discussed in terms of having enough of it, as illustrated by C3P5:

\[ C_3P5: \text{“... And having space to do whatever you’re doing.”} \]

Having things in a convenient place was connected to the meaning of comfort by participants. Participant C2P3 wanted a convenient place for items he needed for biking. Members of the C8 household discussed having space for belongings, while C8P16 commented on having space to store items and C8P14 reflected on the amount of space they have in their home for their musical interests:

\[ C_{16}P_{27}: \text{“... not being too messy. Our stress levels go up when it’s untidy which is a challenge when you’re doing decoration.... It’s the main space being tidy, like the lounge, bedroom, kitchen, the spaces you use every day... the back bedroom was just a dumping ground, because it was locked away, you couldn’t see it...”} \]
In considering adaption of space, C6P11 commented on the meaning of various spaces in their home including the convenience to adapt certain spaces when necessary to accommodate social activities and the occasional extra bed for guests:

C6P11: “It’s like we had 12 people for Sunday lunch on Sunday, and it went fine, we put a couple of tables here and had them all round, we don’t do that very often. I think being able to have people to stay is quite nice; extra sleeping places and so on.”

Participant C6P11 also noted peace and quiet as meaningful to comfort; he drew upon his own experience he found the layout and space in their home was instrumental to allowing him time away from the noise of his children:

C6P11: “Sometimes it’s peace and quiet, .... having room for the teenagers to do stuff that doesn’t disturb us too much, so like the drum room is the far end of the house its almost outside really, and yet not be totally separated from us, because we like to know what’s going on, suspicious parents!”
5.12.2.3 Psychological Wellbeing

This theme consists of aspects raised connected to psychological wellbeing at home. There were no dominant aspects within this theme, however there were several emerging concepts which were of interest and are discussed below.

Security

Some householders associated home security to feeling comfortable; securing the home seemed like a necessary process in order to feel safe and able to get comfortable. C4P7 stated knowledge the home was secure allowed them to get comfortable in their home:

\[
C_4P7: \text{"See I'd go for security or secure. You're comfortable because you can relax because you know nobody can get in."}
\]

C13P23 discussed how past experiences had led them to be more conscious of their home security; the impact of being burgled not long prior to the interview had made securing the home a significant part of feeling comfortable:

\[
C_{13P23}: \text{"At the moment security. Comfort is based on security after what we went through which is very important."}
\]

Familiarity

An interesting point was touched upon by C1P1 and C3P6, the idea of familiarity of the environment being associated with comfort. C3P6 drew upon the need for familiarity to avoid an impersonal environment; however they also noted the attraction of ‘new’ being introduced into the home:
There were no dominant aspects; however, emerging aspects of interest are discussed below.

Participants discussed both being entertained and being able to entertain as part of their meaning of comfort. In terms of entertainment, participants mentioned watching television. Householders found comfort in the ability to entertain guests in their home, have people around for meals and to stay the night. This crossed over with the ability to adapt certain spaces to accommodate such situations, as expressed by C6P11, his wife also expressed the same opinion in regards to socialising with guests in their home:

\[
\begin{align*}
C6P11: & \text{“I think being able to have people to stay is quite nice, extra } \\
& \text{sleeping places and so on.”} \\
C6P10: & \text{“... entertaining, we have people round a lot, usually we have a } \\
& \text{couple of families round on a Sunday.”}
\end{align*}
\]

Householders were asked how they created comfort in the home which included a probing question to encourage participants to consider other elements of comfort other than thermal elements which had been a feature of the CALEBRE project. Participants described a wide range of elements to creating comfort in their home. Similarly to discussing the meaning of comfort, householders often referred to...
several different elements which collectively created their comfort experience, as demonstrated by C12P21 response:

\[ C_{12}P_{21}: \text{“Probably get changed into something more comfortable, have a cup of tea, watch the telly. Have some tea.”} \]

The following data map presents the main themes significant to creating comfort (see Figure 10)
Figure 10: Creation of Comfort Data Map
The main themes of creating comfort in the home are divided into four main categories: the environment and physical comfort, aesthetics and perceptions of space and order, psychological wellbeing and interactions and activities which are discussed in the following sections.

5.12.3.1 The Environment and Physical Comfort

Within environmental and physical factors the strongest themes were associated with thermal comfort, sitting comfort and comfortable clothing:

**Thermal Comfort**

Thermal elements of the environment were referred to by a majority of participants; in particular, controlling the temperature in the home. Of the householders interviewed, 18 participants discussed ways of creating and maintaining a warm environment; 12 of these were females and 6 males.

Participants discussed keeping warm through a variety of behaviours, such as bathing, putting on extra clothes or sitting in the sun. Participants C17P29, C13P23 and C18P30 drew upon the ability to adjust the temperature of the heating system; in addition C18P30 also stated using an open fire for warmth was important to creating comfort and putting on extra clothes as options for temperature control.

The following quotes demonstrate several ways participants kept warm:

- **C17P29:** “Make sure the house is warm, put the heating on.”
- **C8P14:** “Put the telly on, make sure it’s nice and warm, open a glass of wine.”
- **C18P30:** “The more I think about it, a lot of it is down to temperature, because I’m thinking, I’ll come in here, I’ll put the fire on, turn the radiator up or down, or maybe put a jumper on.”

As touched upon in the above quote from C18P30, adaptive behaviours to create and maintain a warm and comfortable environment were identified; behaviours
such as putting on extra clothing, bathing or wrapping up in blankets were cited actions for keeping warm. The cost of heating played a role for C5P9; she noted how the expense of heating her home meant she was restricted to having her heating lower as a result:

C5P9: "Being warm, or warm enough. But then you have constraints, if you haven’t got high income, you put on another sweater and wear a scarf around your neck rather than put the heating up. I keep the heating pretty low, it’s about 17... there’s a gas fire in the front room... I’ve tried not to use it, as gas is expensive anyway."

Others participants expressed a preference for keeping the home cooler. C18P31 stated that, although she could turn the heating up, it was more convenient to put a throw over herself. Whilst C9P18 stated, even during the winter, she felt it was more logical to put clothes on than to heat the entire house:

C18P31: “See, most evenings I turn the heating down, so it’s the radiators, well I think perhaps the radiator is on, but the heating has been down, I’ll just get myself one of these [throw] put this over the top of me rather than get up and turn the radiator or the heating up."

C9P18: “We tend to keep the house cooler than some people probably, so we think it makes more sense in the winter to wear a cardigan or even two sometimes than try to keep the house that warm...”

Whilst C7P13 also referred to carrying out adaptive behaviour, he noted how his property was draughty, failed to retain heat and was especially cold in cold weather conditions. As a result, he wore more clothes in the house but he drew specifically upon the cosy feeling of wearing jumpers.
Similarly, C1P2 felt she could not rely on maintaining a consistent indoor temperature in the home and thus wore extra socks in the prevention of chilblains:

*C1P2: “keeping the right temperate but often having to put extra socks on. You can’t rely on the temperature in the house to keep yourself physically comfortable especially when you suffer from chilblains as I do. Even regulating the thermostat is not always going to do the job and you can be... this room is warm, this is the room where I would feel comfortable to work.”*

A small number of households discussed the use of open fireplaces in the home to help create a warm environment. Some participants, such as C7P13, associated the use of the fireplace with a cold environment, suggesting it is not used as a primary source of heating the home:

*C7P13: “If it’s cold in the evening, we’d shut the door and put the fire on.”*

Similarly to the meaning of comfort, some considered an open fireplace as more than offering the comfort of warmth but also referred to the ambience and aesthetic value it brought to their home; as expressed by C13P23 and C3P5:

*C13P23: “Wood burning stove, because it so gorgeous, heating on as high as you can possibly get it.”*
Some responses referred to the seasonal differences in their behaviour and expectations of the indoor environmental conditions. This was not a strong theme but was an interesting point touched upon by a smaller number of participants. C12P22 was able to make the most of the warmth from the sun by sitting directly within the sunlight coming through the window during the winter to create an environment to unwind in. Whilst in the summer, with warmer weather conditions the same participant achieved comfort from being outside in the garden:

C12P22: “Actually to be fair in winter I go upstairs to the bedroom to have my cup of tea because it’s warmer, and the sun shines through, the sun shines through so I’ll probably go and sit up there and unwind... If its summer I’ll go straight to the garden, I’d prefer to be outside.”

C8P16 also drew upon seasonal differences when describing her ideal situation for comfort in the winter. Interestingly, she stated coming in from the outside to sitting in front of the warm fire with a hot drink, suggesting moving from cold to warm is a positive sensation:

C8P16: “Watching films, I think if we’d been out for a walk, I suppose my ideal Sunday afternoon in winter would be coming back from a walk and having a nice open fire with a hot chocolate and a good old film.”

However several householders also noted how some of these behaviours also held other attributes which were also important to them such as a sensation of cosiness, or a feeling of familiarity. An interesting point was made by members of the C8 household, mother (C8P16) and daughter (C8P15) discussed the multiple meaning
behind the use of quilts. C8P15 stated the quilts did not only provide warmth but also a cosy sensation, whilst C8P16 also noted the sentimental value of the homemade quilts to their family:

*C8P15:* “I like getting quilts and piling them on the sofa and just watching TV or a film or something…. It’s warmth but you feel really cosy and more comfortable.”

*C8P16:* “It’s partly a security thing as well, you always have your grandma’s quilts, my mum made them kind of homemade quilts didn’t she, but you like to snuggle up in those don’t you.”

**Sitting Comfort**

Sitting comfort was referred to by many participants as being significant in creating a comfort in the home. Many of these participants mentioned sofa or chairs. Some commented on the importance for ‘comfy’ seating, such as C1P2 drawing on her requirement for support. She also made reference to finding a comfortable seating position by putting her feet up and using pillows for extra support:

*C1P2:* “Comfort means feeling good when I’m sitting in a chair, able to put my feet up, the chair is right gives me the right kind of support or putting a pillow behind my back if I’m sitting on the couch as the couch doesn’t give enough support.”

This was also noted by other participants, for example C9P17 who preferred slouching and C4P8 expressed a preference for snuggling:

*C9P17:* “Fling your shoes off and lay out on the couch, slouch.”
It is also worth noting that, the participants who discussed sitting comfort did so as part of creating their overall comfort experience, making reference to watching TV or having a something to drink:

*C6P11: "It just depends, I might have a glass of wine and sit down and I might read, I might watch TV."*

**Change Clothes**

Changing into more comfortable clothing was considered too an attribute of physical comfort although it also bares psychological connotations as well. Participants referred to certain clothing as being more comfortable as demonstrated by C12P21. Comfort was signified by C4P8 by changing from work clothing to home clothes:

*C12P21: ".... get changed into something more comfortable."*

*C4P8: "I take off my work clothes and put on something sloppy."*

Other aspects of the environment and physical comfort which were identified included natural lighting and sound, shutting out all natural lighting by closing the curtains, and the desire for a quiet environment.

**5.12.3.2 Aesthetics and Perception of Space and Order**

This section presents the strongest themes of aesthetics and perceptions of space and order, these were in reference to the aesthetics and personalisation, order, places for things and use of space.

**Aesthetics and Personalisation**
Few participants drew upon the aesthetics and the personalisation of the home in creating comfort. This was less than those who associated this factor to the meaning of comfort. Participant C1P1 expressed pride in personalising his home and the significance of making it his own to the extent where he made changes frequently:

\[C1P1: \text{“...decoration is highly personal, again I think it’s important to both of us but probably more obsessive where I’m concerned I’m probably a rare species a ‘male nest builder’, I do like to know I’ve made stuff look the way I want it to look even if I’m not happy and do it again, but I do mess about with stuff constantly. It drives her mad, but I think the result is you’re reasonably happy!”}\]

The C2 household also commented on the aesthetics of their surroundings, both C2P3 and C2P4 shared the same view, C2P3 noted his preference for quality and simplistic design of his home:

\[C2P3: \text{“I quite like a tidy house and I like things in places where I know where they are. I also want things to look nice and be solid and simple and look nice... space, colour, nice design, craftsmanship.”}\]

\[C2P4: \text{“Pleasing to the eye so it looks nice.”}\]

**Order, Space and Place**

Some householders felt creating comfort required maintaining order within the home through keeping it tidy, free from clutter or having space for belongings. Participants also expressed a desire to have things in convenient places, for example C2P3:

\[C2P3: \text{“I like things in convenient places. I quite like a tidy house and I like things in places where I know where they are.”}\]
C3P5 touched upon the difficulty of maintaining a clutter free home with children, she also expressed the need to have enough space for activities:

\[ C3P5: \text{“I think space, anything you’re doing, to have the space....I can’t stand clutter. Which is very difficult when you’ve got 2 children.”} \]

Whilst tidiness was also noted as important for C4P7 they also commented on the obstacle an untidy home plays in creating comfort:

\[ C4P7: \text{“... tidy up. Yeah because if you see, if there’s too many jobs that need doing nearby, I can’t be comfy.”} \]

5.12.3.3 Psychological Wellbeing

This section will outline psychological aspects of comfort from the data which contributed to them being able to create a comfortable environment, this includes several attributes such as relaxation, being stress-free and having time to create comfort. In this section the stronger attributes of psychological wellbeing at home will be discussed.

Relaxation

For some participants creating comfort was simple; it was the ability to do nothing but relax. Being able to unwind and be stress-free were aspects of personal wellbeing referred to by participants as illustrated by the following quotes by C11P19, C8P15 and C1P2, the latter of whom, drew upon past experience when stress prevented her from being able to create comfort:

\[ C11P19: \text{“Come and sit down and relax and that’s it.”} \]

\[ C8P15: \text{“Yeah and make a cup of tea and not have to worry about anything.”} \]
Comfort Food

Several participants referred to eating and drinking within their comfort experience. Comfort foods, wine and hot drinks were all amongst items mentioned however a vast majority of responses in this area referred to having a cup of tea. In most cases it was listed with other factors such as sitting and or watching television. Both C8P14 and C12P21 expressed their association of a warm drink within the process of getting comfortable:

"I’d come in, have a cup of tea, put the telly on, make sure it’s nice and warm, open a glass of wine."

"Probably get changed into something more comfortable, have a cup of tea, watch the telly. Have some tea. Yeah."

5.12.3.4 Interactions and Activities

This was not a dominant theme for creating comfort; however interesting insights were entertainment and entertaining guests. Participants discussed ways in which they entertained themselves at home, this included reading and socialising, a majority of those who noted watching television. Similarly to other examples of creating comfort, participants noted a variety of important aspects to creating comfort, for instance, both C3p6 and C15P26 note sitting comfort was of significance alongside watching TV:

"Stress free as well. If I’m not stressed by anything not working properly. When the boiler broke down it wasn’t very comfortable and that wasn’t just because it was freezing, it was just the stress associated with it and you don’t know how long it’s going to ask for before you can get it fixed."
In household 6, C6P11 made reference to a variety of activities which he associated with comfort, whilst his wife C6P10 expressed the desire to be able to have people round the house noting the seasonal differences between activities:

*C3P6: “It’s simple stuff, just getting comfy in a chair, watching TV… I’ll nibble in front of the TV.”*

*C15P26: “Put the telly on, sit and watch the programs I want or just do nothing.”*

C6P11: “It just depends. I might have a glass of wine and sit down and I might read, I might watch TV, in the summer we quite like doing things outside, so we can sit outside for a while.”

C6P10: “Friends, sort of ‘chilling’, just being around. Like often on a weekend, we’ll have people round for lunch at 1 and then we’ll often just hang around indoors in the winter and outdoors in the summer until say 6ish.”

### 5.13 Discussion

The findings for this study were divided into meaning and creating comfort, data for both were spread amongst four main themes: the environment and physical comfort, aesthetics and perception of space, psychological wellbeing and interaction and activities. These four dimensions represented householders’ multifaceted notions of comfort, proving to be broad and varied amongst the sample. A majority of participants provided multifaceted responses which included elements from more than one of the themes; suggesting a combination of factors contribute to
experience comfort. The presence of several variables is typically an accepted notion of comfort; however this study has revealed the scope of factors householders associated with the experience. Although it is important to understand the individual factors which are associated with comfort in order to crystallize a broader notion of householders comfort, it is also significant to acknowledge the interconnectivity between these variables. While this is not fully explored by this research, other research has shown that satisfaction of one factor, for instance, thermal satisfaction, does not necessary result in overall comfort (Humphreys 2005).

Responses to the two questions on meaning of comfort and the creation of comfort were quite similar in terms of scope, with the same aspects identified during responses to both questions and fitting within the same four themes. In both sets of responses, householders drew upon instances from their everyday lives; although in response to creating comfort, householders provided more examples. This suggests the meaning of comfort is strongly associated with their experiences; therefore householders experience their own notion of comfort, rather than applying a universal and/or rigid definition.

The following discussion draws together the creation of comfort and the meaning of comfort across the four main themes to discuss their contributions to exploring the phenomena of comfort.

5.13.1 The Environment and Physical Comfort

Many of the elements of comfort in this area have been extensively researched and can be considered to adhere to the more traditional notions of comfort. As suggested by its dominance in the literature, thermal comfort was a significant feature of both meaning and creating comfort in the home. Thermal comfort was significant to the meaning of comfort, in particular the sensation of being warm, cool or cold; whilst responses to creating comfort tended to more dynamic, with participants suggesting active ways to achieving this sensation. A majority of responses on thermal comfort were associated with keeping warm. More often, female participants associated warmth with the meaning of comfort and creating
comfort, this could indicate more females prefer warmer environments than males or perhaps female participants place a higher significance on warmth. This supports findings from Karjalainen (2007) whose research examined gender difference in indoor room temperatures in both home and office environments. He found females preferred higher indoor room temperatures than males and were also less satisfied with varied temperatures. Although this does share similarities with the data collected in this study, to come to this conclusion would mean making several assumptions on what constitutes comfort which, in effect, would be a barrier to the aim of this study.

In describing the thermal environment, participants made reference to achieving a ‘warm enough’ temperature and drew upon a distain for being cold. It is impossible to gauge a temperature range from this information but it does highlight the individual perception of what constitutes comfort, warmth, the right temperature, not cold, etc. What may be warm enough for one person may be different for another. Research has shown householders have an expectation for maintaining warmer indoor climates in their homes than they have in the past. National statistics show in 2010 the average internal temperature in UK homes was 16.9°C (external temperature of 4.3°C) where in in 1970 the average internal temperature was 4.9°C lower at 12°C (external temperature of 5.8°C). This does support the preference participants showed for warmth in order to achieve comfort. Also noteworthy, interviews were conducted during the winter which may also have played a role in the prominence of the thermal environment in the responses given by participants.

Behaviours associated with adaptive thermal comfort were a strong theme in the creation of comfort. As a means of keeping warm, participants referred to making personal adaptation such as putting on clothing or covering themselves with a blanket or throw. These types of thermal adaptive behaviours are referred to as behavioural adjustments; the term applies to the changes an individual may make to address an uncomfortable thermal environment. In this study, this was typically changing clothing, but also environmental changes such as adjusting the control of the heating system or closing/opening windows (de Dear et al. 1998). Making
behavioural adjustments allows householders to control their own personal comfort which may be particularly significant in shared households. Keeping warm via adaptive behaviour was also associated with the cost of heating and the efficiency of the heating system; householders used such changes in behaviour and environment to reduce the cost of heating their entire home. Reducing energy consumption was not expressed in relation to reducing carbon emissions or pertaining to a greener lifestyle, drawing attention to what may be most important to the householder in the efforts of reaching government carbon emissions targets.

A number of participants discussed different expectations and behaviour during the winter and summer seasons especially in describing ways in which they create comfort. This further supports the experience of adaptive thermal comfort at home; the principles of adaptive thermal comfort which, are built on occupant expectations for varying indoor temperatures dependent on seasonal changes.

An example given by one participant of the ways they create comfort touched upon the significance of positive alliesthesia as a pleasurable and comfortable experience. De Dear describes alliesthesia as the state that 'leads us to seek pleasant stimuli and avoid unpleasant ones' (de Dear 2011, p.110). This is driven by the body’s regulatory system. For example, the state of thirst may drive someone to drink an excessive amount of water. In this case, the thermo-regulatory system drives a change in environment. One participant described returning from a walk on a cold winter’s day to sit in front of the warm fireplace. Interestingly this was described as an ideal situation, suggesting the extreme cold environment is as desirable as the warm environment. Research into alliesthesia tends to focus on the physiological and physical responses rather than the psychological process which drives them. An examination into the psychological process could potentially open new avenues for thermal comfort research.

A majority of the households which discussed fireplaces had homes with open or wood burning stoves, it was noted fireplaces were not exclusively used for warmth, they also held aesthetics qualities, and created a nice atmosphere for comfort. It would appear the qualities a fireplace holds could be categorised as both physical and aesthetics in nature. Similarly, a study considering the cultural influences on
thermal comfort behaviours in Sweden, found a strong connection between fireplaces and the creation of what was considered a cozy and peaceful environment; moving beyond the typical thermal comfort qualities of warmth.

Sitting comfort was frequently referred to as significant part of creating comfort. A majority of participants just expressed the need to sit rather than any particular characteristics of the seating, although ‘comfy’ was used to describe seating occasionally. The significance of seating comfort is strongly supported by literature, in particular within ergonomics research which has shown comfort is associated with the objective seating dimensions and body size (de Looze et al. 2003; Teraoka et al. 2005), therefore some will be more comfortable than others. Thus some seating is likely to be perceived as more comfortable than others.

5.13.2 Aesthetics and Perceptions of Space and Order

Having a home which occupants regard as beautiful was frequently referred to as important in the meaning of comfort and also in the creating comfort in the home. The significance of aesthetics as a pleasant or desired quality of the home is heavily supported by the literature (Sixsmith 1986; Pennartz 1986; Marcus 1997; Heijs & Stringer 1987; Smith 1994; Csikszentmihalyi & Rochberg-Halton 1981) Self-expression and personalisation has long been associated with the characteristics of a home. Csikzenmihalyi and Rochberg-Halton’s (1981) book The Meaning of Things suggested cherished household belongings were often signs of self-expression or signs of the person they aspire to be. There is meaning behind their value to the householder which may be consciously known or sub-conscious to the householders. The findings also drew similarity to aesthetic needs within Maslow’s Hierarchy of Needs; described as the need for beauty, order and symmetry within life. If aesthetics are seen as a need to be fulfilled or achieved, then its association with achieving comfort at home can be explained. As illustrated by the literature and the findings of this study, the importance of aesthetics in terms of self-expression or familiarity of surroundings is an indistinguishable part of home and thus an important element towards the meaning and creation of domestic comfort.
Participants expressed the need to have their home in order, tidy and uncluttered in the creation of comfort. It appeared that a cluttered and untidy home acted as an obstacle to experiencing comfort at home, so cleaning or tidying up became a necessity in order to create comfort. Research has shown householders’ order and arrangement of clutter to be unique to the home environment, viewing the home as an orderly and safe place unlike the world outside, thus driving the tidiness and their management of clutter (Swan et al. 2008). With this in mind, it is clear how the presence of clutter or untidy surroundings may represent a lack of order and impact on householders’ abilities to create a comfortable experience.

### 5.13.3 Psychological Wellbeing

Attributes of a psychological nature ranged from relaxation to interacting with householders. There were many crossovers between this theme and others. For instance, the expectation of seasonal differences and the significance of past experiences are psychological aspects of adaptive thermal comfort; the socialising and the use of space, as well as being able to accommodate more guests relates to both this theme and aesthetics and perception of space.

‘Comfort food’ was included as part of psychological wellbeing although could pertain to physical comfort, as it involves satisfying a basic physiological needs or interactions and activities. However, it also holds emotional attributes. Research has shown people consume comfort foods (including drink) for a number of reasons: it could be the indulgence of consuming something which is a highly calorific, it could offer physical comfort such as the warmth of a hot drink, or perhaps the convenience of which some foods can be sought and consumed (Locher et al. 2005). Although participants identified food, and in particular, hot drinks as part of creating comfort, the reasoning cannot be substantiated from this data alone.

Security was an aspect of comfort which was referred to in two ways, in terms of home security and also in terms of ‘familiarity’. Familiarity has been discussed earlier as a part of aesthetics and space, drawing upon the importance of personalisation of the home. Security has been described as an essential quality of the home which supports its significance to the meaning of comfort (Smith 1994).
Maslow’s theory of human motivation draws upon the importance of safety and security after basic needs have been fulfilled, which suggests it is not just a significant aspect of the home but also fundamental human need (Maslow 1970). Home security was significant to one household in particular in terms of creating a comfortable environment. They had recently been burgled which had led them to note securing their home as an important feature to feeling comfortable. It appeared, as a result of the burglary, their notion of comfort had changed, emphasising the importance of past experiences in moulding comfort.

5.13.4 Interactions and Activities

Although the least prominent theme for both meaning and creating comfort, there was a clear association between entertaining and the amount of space; some discussed the adaption of space to be able to entertain or have people around to stay. Having enough space for socialising was particularly important for the meaning of comfort. This is supported by the literature; Oseland and Raw (1991) found householders who felt they had inadequate space were less likely to entertain or have people over to stay. However the actual space and perceived space have a complicated relationship which depend on the dimensions, layout and furnishings in the home (Atlaş & Özsoy 1998).

5.13.5 Reflections

This section will reflect on the approach, the data collection and analysis process and the role of the researcher.

In terms of the design of the methodology, the main two questions were designed to explore the meaning and the creation of comfort; however householders offered similar responses to both questions, scoping the same four themes which led the researcher to wonder whether this was the result of a misinterpretation of the meaning of the two questions. The researcher’s personal interpretation of questions led to the expectation that the question on the meaning of comfort would be interpreted by participants as referring to an all-encompassing, multisensory and perhaps idyllic definition; whilst the question on creating comfort
was expected to be interpreted as referring to personal experiences, with participants drawing heavily on their own behaviour and comfort-making activities. In reality, the two questions appeared to draw a mixture of responses ranging from the idyllic experiences to those enclosed within the restrictions of what is currently possible in their home. However as stated at the beginning of the discussion section, it is a possibility that householders may derive the meaning of comfort from their creation of comfort, suggesting the similarity in responses could be as a result of householders drawing upon the meaning of comfort from their own experiences of comfort resulting in a personal definition.

It should also be noted that the design of the questions was fitting to the phenomenological approach taken; the purpose of the interview was to explore householders’ perspectives of comfort without boundaries and as free from preconceived ideas of the notion of comfort as possible. The two main questions asked to participants gave them the freedom to express their ideas fully, without restrictions. With this in mind, it is easy to see how the questions were also vulnerable to misinterpretation.

It is important to also consider the potential impact of the exclusion criteria on the findings. The CALEBRE project was concerned with retrofitting in properties built pre-1930's with solid wall structure. Often referred to as 'hard to heat' homes, solid-wall properties have difficulty retaining heat which may result in thermal elements associated with comfort holding more prominence than others (Vadodaria et al. 2010).

Deriving from a phenomenological approach, the phenomenon of domestic comfort at this stage of the research was approached without framing or guidance from the researcher. The interview process allowed householders’ understanding and experience of comfort to be discovered and, as a result, a broad scope of attributes associated with domestic comfort was identified. It appeared the home setting for interviews also encouraged participants to explore the depths of this topic, with many making direct references and gestures towards the areas of their home relevant to their responses. Encouraging participants to discuss other
aspects of comfort other than thermal comfort also contributed to the identification of aspects within the other fields.

A majority of the interviews were conducted with both husband and wife simultaneously; this introduced a new and interesting dynamic to the interview process. What is not known is whether the presence of other householders may have influenced responses. For instance, there were occasions when householders agreed with response given by their partners as illustrated by husband (C8P14) and wife (C8P16), in response to what does comfort mean to you, C8P14 stated “Warmth in the winter”, this was shortly followed by his wife (C8P16) stating “I would say warmth as well.” It is not known whether his wife may have given a different response in a one-on-one interview setting or if they had answered first. In contrast, in some interviews, householders stressed the differences between their views this was illustrated by husband (C1P1) and wife (C1P2); when C1P1 stated to his wife during the interview “I think you’re physical and I’m aesthetic you see.” Although it is possible, the dynamics of having multiple householders present could have altered responses; there is no evidence to suggest this impacted on the findings given the wide scope of factors discussed.

Key to the interpretive phenomenological approach is the acknowledgement of the researcher’s taken-for-granted understanding of the phenomenon. In the case of this particular phenomenon, comfort in the home, the researcher has her own personal experiences and has also gained her own understanding of the phenomenon through reviewing literature in the field which could have potentially influenced the interpretation of the data. However this previous knowledge proved valuable in interpreting the descriptive data collected. The researcher was able to visualise the home environment and behaviour of the participants’ with ease; sharing participants interpretation of experiencing comfort.

5.14 Conclusions

This study captured a range of dimensions which householders’ associated with the experience of comfort. The broad scope of dimensions identified by householders’ allowed their understanding and experience of the phenomenon to be interpreted,
identifying four main themes: the *environmental and physical comfort, aesthetics and perception of space and order, psychological wellbeing* and *interactions and activities*. The meaning of comfort and the ways in which it is created by participants share very similar attributes; however creating comfort listed more active aspects such as adaptive behavioural changes and sitting comfort.

It was found that the attributes of the four main themes were interlinked and several attributes identified shared qualities of more than one of the themes. For instance, adaptive thermal comfort was categorised as an aspect of the environment and physical comfort, but also shares a psychological nature; or the significance of familiarity to the meaning of comfort, which was categorised as holding psychological attributes but also could be categorised under aesthetics and perception of space and order. The connections between the themes emphasises the multiple dimensions which can be at play in creating a comfortable experience and the challenge of isolating individual attributes.

The broad and multifaceted nature of the data was captured with the theoretical approach taken. Interpretive phenomenology allowed the notion of comfort to be examined without boundaries, as discussed in the previous section on reflexivity, while the data analysis process of coding and theming the data does in a sense provide a manageable boundary for the phenomenon under investigation.

This study identified the presence of several dimensions which have an extensive foundation of knowledge in the literature, and others which have been less explored. As a result, the next step of the research takes a closer examination of the psychological attributes of comfort.
Chapter 1: Introduction

Chapter 2: Literature Review

Chapter 3: Research Paradigm

Chapter 4: Methodology

Chapter 5: Exploring Householders’ Perspective of Comfort in the Home

Chapter 6: Household Profiles

Chapter 7: Insights into Comfort and Daily Routines

Chapter 8: Exploring Psychological Dimensions of Comfort in the Home

Chapter 9: Capturing Comfort in Context

Chapter 10: Discussion: A Classification of Domestic Comfort

Chapter 11: Conclusions and Future Work

Chapter 12: References

Chapter 13: Appendices
6 Household Profiles

Following study 1, which explored the breadth of domestic comfort from the householders’ perspective, studies 2, 3 and 4, will take an in-depth approach to exploring comfort within the homes of twelve participants. This chapter will give a snapshot of the twelve participants and their households which will be involved in the following three studies.

Participant 1: Maria

Maria is 29 years old and shares a flat with her partner in Luton. She works within housing and describes her job role as an associate professional and technical occupation. She has lived in her top floor flat for 2½ years and in this time she has been able to decorate and furnish the property to her taste. Maria finds warmth a particularly important part of her comfort at home, however she finds warmth difficult to maintain with single-glazed windows throughout the flat and electric storage heaters.

Rooms: 1 bedroom, bathroom, spare/study room, living/dining room, kitchen.

Participant 2: Eva

Eva is 48 years old and lives in a semi-detached house in Luton with her husband and three children. She has two children under twelve and 1 daughter away at University. She works as a teacher and is also completing a postgraduate course part-time. Eva and her family have lived in their semi-detached house for 16 years, in that time they have extended the property so that the bedrooms upstairs were larger and a WC could be fitted downstairs. Family is important to Eva and she enjoys spending quality time with the family.

Rooms: 3 bedrooms, 2 bathrooms, living/dining room, kitchen.
**Participant 3: Pauline**

Pauline is 57 years old and lives in an end-terraced house with her husband in Luton. Pauline works at a local school in an administrative role. They've lived in the property for 35 years, raising two children who now have young families of their own. She enjoys spending time at home with her children and grandchildren when they visit and uses all rooms to accommodate their stay. She also enjoys arts and crafts projects and now uses her son's old bedroom as a craft room. Pauline and her husband were able to add a conservatory to their property which has given them more space to entertain.

Rooms: 3 bedrooms, 2 bathrooms, kitchen, dining/computer/spare room, living room, conservatory

**Participants 4: Sarah**

Sarah is 51 years old; she shares a ground floor flat with her husband in Luton. She has lived in the property for two years; her husband also owns a flat in the same building which is how they met. Sarah works for the local council in a technical role. She would ideally like a bigger property with one more room to allow her to have family around to stay.

Rooms: 1 bedroom, bathroom, living/dining room

**Participant 5: Sade**

Sade is 29 years old; she shares a semi-detached house with her mother and brother in Luton. She has lived there for 9 years although her brother has only recently moved in. She works as a teacher at a junior school over an hours commute away, with long days she especially enjoys sitting down and relaxing after work. With 3 adults living in a 2 bedroom property, space is limited. Ideally Sade would like to move out to have a place she can call her own.

Rooms: 2 bedrooms, bathroom, living room, dining room, kitchen
**Participant 6: Walter**

Walter is 59 years old and works as an engineer in a skill trades occupation. He lives with his wife in their four bedroom detached house in Luton. They have lived in the property for six years and have two children who have moved out but still have bedrooms at the family home. Walter has a garden shed to store tools and materials to carry out DIY projects around the home. DIY projects have included redecorating the house, laying loft insulation and creating extra storage space by laying floorboards in the loft. Warmth is an important part of comfort to Walter and he will often relax in the living room with a blanket.

Rooms: 4 bedrooms, 3 bathrooms, living room, dining room, garden shed

**Participant 7: Kevin**

Kevin is 45 years old who works in a professional occupation. He lives in Leicester with his wife and two children under 14 years old. Kevin and his family have lived in their linked terraced house for 11 years in this time they have renovated throughout, including new flooring and new windows. Where possible Kevin has completed the renovation work himself. He has tried to put his own stamp on the property by using personal items to make the property more unique. Kevin enjoys being active and doing something completely different from his job when he is at home; he is particularly passionate about biking.

Rooms: 3 bedrooms, study, 2 bathrooms, living room, kitchen/dining room, back room, (garden) games room

**Participant 8: Mike**

Mike is a 63 years old administrative worker in Loughborough. He lives in a detached house in Leicester with his wife. They have lived in the property for 32 years, raising two children who have grown up and since moved out. In the time Mike has been in the property he has had a conservatory added to the property, which he frequently uses especially in the summer to sit and complete crosswords...
and Sudoku’s. Mike has conducted various DIY projects at the property; he has re-designed his study to feature some his favourite artwork, and also re-built the roof of the garage to create extra storage space.

Rooms: 3 bedrooms, bathroom, study, conservatory, kitchen, utility room

**Participant 9: Rachael**

Rachael is 35 years old; she lives in a detached house in Loughborough with her husband and two children. They have lived in the house for 6 years which is local to the university where Rachael works in a professional occupation. With two children under 10 years old, Rachael finds a majority of her time at home is filled with childcare, however when she finds time she enjoys relaxing in the bath and also snuggling with the cat. They have recently added a conservatory to the property where Rachael enjoys reading and looking out at the garden.

Rooms: 3 bedrooms, living/dining room, study, kitchen, conservatory

**Participant 10: Lewis**

Lewis is a 25 years old researcher at a local university. He is single and shares his mid-terraced house with two housemates in Loughborough. He moved into the house a year and a half ago; renovated and decorated in a neutral style as he had intended to rent out the spare bedrooms. It was originally a two bedroom property but Lewis has converted the front room into a third bedroom. The home now has two main communal areas the kitchen and the living/dining room whilst 2 of the bedrooms are rented out to friends. In his spare time, Lewis enjoys doing something challenging and different from his job, such as learning a language or playing the guitar.

Rooms: 3 bedrooms, living/dining room, bathroom, kitchen
**Participant 11: Jessica**

Jessica is 28 years old; she lives in a semi-detached house with two housemates in Loughborough. She has lived in the house for two years. During this time Jessica has had the attic converted into her bedroom and bathroom, and the front room has been changed into a fourth bedroom whilst the conservatory is used as the living/dining room. Jessica is a researcher at her local university and currently shares her home with two fellow researchers and friends. The kitchen is a hub of the house since Jessica frequently enjoys cooking and it is often where housemates gather to catch-up.

Rooms: 4 bedrooms, 2 bathrooms, living/dining (conservatory), kitchen, garden

**Participants 12: Olivia**

Olivia is a 26 years old researcher at a local university; she shares a two bedroom mid-terraced house with a fellow researcher and friend. Having had the property for two and a half years she has decorated the home to her taste with photographs and keepsakes from travelling. After work, Olivia enjoys lying on the sofa and relaxing in front a movie or in the summer reading outside in the garden.

Rooms: 2 bedroom, study, living/dining room, bathroom, kitchen, garden
Chapter 1: Introduction

Chapter 2: Literature Review

Chapter 3: Research Paradigm

Chapter 4: Methodology

Chapter 5: Exploring Householders’ Perspective of Comfort in the Home

Chapter 6: Household Profiles

Chapter 7: Insights into Comfort and Daily Routines

Chapter 8: Exploring Psychological Dimensions of Comfort in the Home

Chapter 9: Capturing Comfort in Context

Chapter 10: Discussion: A Classification of Domestic Comfort

Chapter 11: Conclusions and Future Work

Chapter 12: References

Chapter 13: Appendices
7 Insights into Comfort and Daily Routines

7.1 Introduction

So far, the research has identified the scope of dimensions which are associated with comfort in the home. The first study identified many attributes which were categorised into four main themes of comfort: environmental and physical comfort, aesthetics and perception of space and order, psychological wellbeing and interactions and activities. The scope of attributes which contributed to householders’ experience of comfort included those which were traditional and extensively researched, such as warmth or sitting comfort, and others which were uncommonly attributed to comfort, such as home security or the adaption of space. The first study identified a need to conduct an in-depth exploration of the experience of comfort in the home in order to identify and understand these uncommon aspects further and also gain an understanding of how comfort fits into the daily lives of householders.

This chapter describes a study that begins to uncover these features of comfort in more detail, with a sample of householders who also participate in the following studies 3 and 4 (reported in Chapters 8 and 9). With the anticipated scope of data and the multiple self-reporting methods being used through the data collection process; this study also served the purpose of briefing participants for studies 3 and 4.

Therefore this study was conducted for the purpose of:

- Engaging participants in the topic of comfort, encouraging them to explore the multiple dimensions of their own comfort experiences at home, and establishing how comfort fits into their everyday routines.
- Introducing participants to the tools and techniques they will be using during the data collection process for studies 3 and 4.
7.2 **Study Aims**

This study was conducted to facilitate a dialogue amongst householders on the topics of comfort and everyday home life. The aim was to establish the comfort and unwinding activities householders carry out in their everyday lives.

7.3 **Study Rationale**

The focus groups were designed to provide an ideal setting for householders to share their everyday routines and their experiences of comfort at home. This stage served the purpose of learning about specific activities which participants carry out to create comfort. The findings of this stage will be used to identify potential comfort activities in the diary routines in study 4: Capturing comfort in context.

7.4 **Methods**

The value of engaging participants in the research topic prior to the main study is a technique which has gained prominence within user experience research using, in particular, a process known as context mapping. The purpose of context mapping is to gather rich and broad contextual information from users in a form which can be transferred to the designers (Visser et al. 2005). The process of context mapping uses generative techniques to evoke a deeper level of thinking in order to gather latent knowledge from participants, deeper knowledge is gained using generative techniques as illustrated by Figure 11. Given the subconscious and intimate nature of domestic comfort, the process for exploring this topic with participants would benefit from using similar techniques to elicit latent knowledge on their personal comfort experiences. Visser and colleagues (2005) described the context mapping process and detailed the steps followed, which includes a stage where participants are engaged in the research topic prior to the main stage of data collection. This is known as sensitisation and is defined as "a process where participants are triggered, encouraged and motivated to think, reflect, wonder and explore aspects of their personal context in their own time and environment." (Visser et al. 2005, p.5) User researchers have described the pre-sessional step as a 'highly valuable role as an
ice-breaker’ (Moule 2010); within this stage, the research topic can be broadly introduced. In reference to this stage of research the sensitisation step is an appropriate method to introduce, engage and prepare participants for the main study.

Ordinarily, sensitisation tools require participants to complete an exercise in their own time and either send prior or report the findings during the main generative session. The tools used for sensitisation are similar to those used in cultural probes and also share the same ambition to elicit unique insights into participants’ lives through creative approaches (Gaver et al. 1999). Typical tools used for both methods include using disposable cameras, workbooks exercises involving open-ended questions, drawings, or diaries. Within the context mapping process, this session is followed by a group sessions where participants can discuss their experiences of the sensitisation step.

For this research, given the self-reporting stages of both studies 3 and 4 to follow, it was considered more appropriate to engage participants in a focus group session to discuss the topic and share experiences of comfort in the home; this approach allowed for generative techniques to be implemented, maintaining a creative element to the sensitisation stage. The session would also provide a fitting opportunity to guide participants through the imminent data collection process for the studies 3 and 4. Further details of focus group methods including generative techniques have been discussed in the chapter 4: Methodology (see section 4.4.2.).
7.5 **Sampling**

A purposive sampling strategy was used to identify suitable participants for this study. The selected participants for this study were also recruited to complete studies 3 and 4 simultaneously, therefore the needs of all three stages were considered during the recruitment process.

The sample criteria was partially shaped by previous findings: the first study identified that participants created comfort by personalising the space through the décor and furnishings which was, to some extent, possible through home ownership and therefore having the freedom to make significant changes to the property. With this in mind, the sampling process for this study focused on recruiting homeowners. Participants were also required to go to work or study at least part-time for the purpose of study 3: Capturing comfort in context.

The full recruitment criteria included:

- Age between 21-65 years old
- Homeowner
- Work / Study 25+ hours a week
- Only one participant per household

Participants were recruited in two locations: Luton, Bedfordshire and Loughborough, Leicestershire. In Luton, the majority of participants were recruited through the local Church community, in Loughborough participants were recruited through Loughborough University, both by word of mouth. Suitable candidates were asked individually and provided with an information sheet which set out all study stages. Once recruited, participants completed the consent forms at the beginning of the focus groups.

Once the study was completed, all participants were given a £30 High Street voucher for taking part in the whole study. See appendix A for the information sheet and appendix B for the consent form.
7.6 Piloting

As the participants were due to complete the focus group along with studies 3 and 4, a pilot study was conducted of all stages. The pilot of the focus group procedure was completed with two participants in Luton; no major revisions were required however additional questions following the ‘day-in-the-life’ exercise were added to provoke further discussion of participants’ activities and routines at home. In addition, questions about the opportunity for participants to share activities they would like to be able to fit into their current routines were included.

7.7 Design and Procedure of the Focus Groups

The focus groups were designed to allow participants to discuss experiences of comfort and their everyday routines; it also included a briefing stage for studies 3 and 4. The design of the focus group followed the guidelines on best practices for focus groups set out by Krueger; questions were designed to flow from general to specific (Krueger 1998). Details of the questions asked can be found in appendix C and Table 8 shows the stages of the focus group design and procedure.

The day-in-the-life exercise was designed to outline a typical day after work for participants; it was intended to focus their attention on the activities which they complete on a daily basis. Participants were asked to share their routines giving them the opportunity to express their emotions and feelings associated to their everyday activities.

Focus groups took place in two locations which were chosen as convenient places for the majority of participants; in Luton it was held in the dining room of a family home, in Loughborough it was held in a meeting room in Loughborough Design School.
Table 8: Focus Group Process

<table>
<thead>
<tr>
<th>Focus Group Process</th>
<th>Details of Stage</th>
<th>Time Taken (minutes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction to Focus Group</td>
<td>Outline the focus group process</td>
<td>1-2</td>
</tr>
<tr>
<td>Briefing for Study 3 and 4</td>
<td>Oral instructions to the photo elicitation interview process, time for questions.</td>
<td>8-10</td>
</tr>
<tr>
<td>Introductory and Key Questions for Study 3</td>
<td>Question to introduce the topic of comfort and focus the discussion.</td>
<td>10-15</td>
</tr>
<tr>
<td>Transitioning Questions</td>
<td>Use to link between study 3 and study 4</td>
<td>2-5</td>
</tr>
<tr>
<td>Key Questions For Study 4</td>
<td>Questions to focus the discussion on topic towards routines.</td>
<td>10-12</td>
</tr>
<tr>
<td>Day-In-The-Life Exercise and Closing Questions (Study 4)</td>
<td>Exercise to explore daily routines, discussion and questions focusing on routines.</td>
<td>12-15</td>
</tr>
<tr>
<td>Next Steps</td>
<td>Next contact with participants</td>
<td>2-3</td>
</tr>
<tr>
<td>Total Time</td>
<td></td>
<td>Approximately 60 minutes</td>
</tr>
</tbody>
</table>

7.8 Ethics

As stated in Chapter 4: Methodology, section 4.8, Loughborough University ethical guidelines were followed, an ethical checklist was completed, and full ethical approval was not required. As this study included off-campus interviews and circumstances where the investigator would be alone with participants; in these incidences precautionary guidelines provided by Loughborough University’s Ethical Advisory Committee were followed to ensure the safety of the investigator.

7.9 Equipment

Both focus groups were recorded with a Dictaphone and video camera, for transcribing later. All equipment required for study 3 and 4 were provided at the focus group, this included the record books, data loggers, and SenseCams. For the focus group activities, participants were provided with A3 whiteboards and pens to write down their routines for the day-in-the-life exercise.
7.10 Data Analysis

The focus groups were transcribed and reviewed so that the researcher was familiar with the data. The comfort activities of households were identified through a review of the audio tape and transcriptions of the focus groups. A thematic analysis was conducted based on the guidelines set out in chapter 4: Methodology, this was conducted for the purpose of identifying interesting and prevalent themes which will be discussed in the study findings section.

7.10.1 NEP Scale

The New Ecological Paradigm (NEP) Scale consists of 15-items, 8 positive and 7 negative, each with 5 responses (Dunlap et al. 2000). Scores are calculated by assigning values between 1 and 5 to the responses, ‘Strongly Agree’=5, ‘Mildly Agree’=4, ‘Unsure’=3, ‘Mildly Disagree’=2 and ‘Strongly Disagree’=1. For negative items the values are reversed (i.e. ‘Strongly Agree’=1 and ‘Strongly Disagree’=5). Mann-Whitney U test was conducted to see whether there were gender differences between attitudes and Spearman’s Rank Order Correlation (rho) was conducted to see whether there was a relationship between age and pro-environmental attitudes. The NEP scale can be found in appendix D.

7.11 Findings

7.11.1 Background Information

This section presents information about the 12 participants who took part in this study, and also studies 3 and 4.

Overall the 12 participants comprised of 8 females and 4 males with a mean age of 40.8 years ranging from 25 – 63 years. Participants were located in 2 places in England, 6 participants resided in Luton, Bedfordshire and 6 in Leicestershire (4 in Loughborough and 2 in Leicester). The marital status ranged from 1 unmarried living with partner, 4 single and 7 married.
All participants were either employed or full-time postgraduate researchers. Using occupational classification from the Office of National Statistics (ONS 2000), the sample consisted of 4 Professional occupations, 3 PhD Researchers, 2 Associate Professional and Technical, 2 Administrative and Secretarial and 1 Skilled Trades.

7.11.2 Household Information

The mean number of householders per home was 2.8, ranging from 2-5 people. The mean number of adults (18+ years) per household were 2.3 ranging between 2-3 adults per household, only 3 out of the 12 households had children, all of which had 2 children. The mean income band was between £30,001 – £50,000, incomes ranging between less than £15,000 to £70,000. The property types included flats, terrace, semi-detached and detached properties; the mean number of years of ownership was 10.5 years, ranging from 1.5 – 35 years.

Table 9 presents a summary of key participant and household information:

<table>
<thead>
<tr>
<th>Focus Group</th>
<th>Participant Number</th>
<th>Participants Name</th>
<th>Gender</th>
<th>Age</th>
<th>Number of Householders</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 1</td>
<td>P1</td>
<td>Maria</td>
<td>Female</td>
<td>29</td>
<td>2 adults</td>
</tr>
<tr>
<td>Group 1</td>
<td>P2</td>
<td>Eva</td>
<td>Female</td>
<td>48</td>
<td>3 adults, 1 children</td>
</tr>
<tr>
<td>Group 1</td>
<td>P3</td>
<td>Pauline</td>
<td>Female</td>
<td>56</td>
<td>2 adults</td>
</tr>
<tr>
<td>Group 1</td>
<td>P4</td>
<td>Sarah</td>
<td>Female</td>
<td>50</td>
<td>2 adults</td>
</tr>
<tr>
<td>Group 1</td>
<td>P5</td>
<td>Sade</td>
<td>Female</td>
<td>27</td>
<td>3 adults</td>
</tr>
<tr>
<td>Group 1</td>
<td>P6</td>
<td>Walter</td>
<td>Male</td>
<td>58</td>
<td>2 adults</td>
</tr>
<tr>
<td>Group 2</td>
<td>P7</td>
<td>Kevin</td>
<td>Male</td>
<td>45</td>
<td>2 adults, 2 children</td>
</tr>
<tr>
<td>Group 2</td>
<td>P8</td>
<td>Mike</td>
<td>Male</td>
<td>63</td>
<td>2 adults</td>
</tr>
</tbody>
</table>
### Focus Group Participant Information

<table>
<thead>
<tr>
<th>Focus Group</th>
<th>Participant Number</th>
<th>Participants Name</th>
<th>Gender</th>
<th>Age</th>
<th>Number of Householders</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 2</td>
<td>P9</td>
<td>Rachael</td>
<td>Female</td>
<td>35</td>
<td>2 adults, 2 children</td>
</tr>
<tr>
<td>Group 2</td>
<td>P10</td>
<td>Lewis</td>
<td>Male</td>
<td>25</td>
<td>3 adults</td>
</tr>
<tr>
<td>Group 2</td>
<td>P11</td>
<td>Jessica</td>
<td>Female</td>
<td>28</td>
<td>3 adults</td>
</tr>
<tr>
<td>Group 2</td>
<td>P12</td>
<td>Olivia</td>
<td>Female</td>
<td>26</td>
<td>2 adults</td>
</tr>
</tbody>
</table>

#### 7.11.3 NEP Scale

The NEP scores have a maximum range between 15 and 75, with a score of 15 representing a negative attitude toward pro-environmentalism and 75 representing the strongest pro-environmental attitude (a score of 45 being neutral). The responses from participants ranged from 43 to 71 with a mean of 55.08 (SD =6.79), suggesting the sample had a slightly positive attitude towards the environment. Figure 12 presents the scores for the participants (see Table 9 for corresponding participant number). There was no significant difference found between males and females’ pro-environment attitude scores (U=14, U_crit=4, n.s). Spearman’s Rank Order Correlation (rho) was conducted to see what type of relationship there was between age and pro-environmental attitude scores, it found there was a negative correlation (rho=-0.55), thus younger participants’ expressed more pro-environmental attitudes than older participants.
7.11.4 Findings

The dynamics of both focus group 1 and 2 was natural and friendly, discussions flowed with ease with minimal prompting was required by the facilitator. All participants contributed to the focus groups and engaged with other participants in meaningful discussions, sharing personal experiences on various aspects of home life. Once the procedure for studies 3 and 4 had been discussed, questions were put to participants on the topic of comfort, unwinding and after work routines.

7.11.4.1 Focus Groups Questions: Comfort in the Home

Achieving comfort in the home was considered important and meaningful by all participants. Participants discussed a series of different elements of comfort drawing upon specific furnishings or rooms which brought them comfort as well as sharing comfort activities and experiences.

The responses given were strongly towards the physical aspects of comfort in particular thermal and sitting comfort as illustrated by the following quotes from Maria, Sade and Pauline when asked about how they achieved comfort at home:

Maria: “The sofa... warmth, blankets, heater.”
A majority of thermal comfort references were in respect to warmth, although keeping a cooler temperature in the home was also important to some individuals, provoking a discussion on the control of the thermostat between members of the household and the difficulty of finding one temperature which suited all. After prompting, responses became more diverse; participants noted attributes such as a quiet environment, changing clothes and snuggling with a cat as important to creating comfort. Interestingly, in both focus groups there were individuals who shared the comfort habit of turning on the television for background noise when alone in their homes, Olivia stated:

Olivia: “I use the telly actually as a comfort thing, ‘cos a lot of the time I’m in the house on my own, half the time I’m not watching what’s on it, it’s just background noise or whilst I’m not doing other stuff, it’s just comforting.”

Achieving comfort at home on a typical working day for participants appeared to take place once other necessary and essential jobs such as chores or ‘odd’ jobs had been completed. Participants stressed the obstacle which chores created to them getting comfortable, as demonstrated by Jessica:

Jessica: “If the house is dirty, then yeah... cleaning... you can’t relax until you’ve done that sometimes.”

From female participants with young children (under 12 years old), childcare came first, and their comfort was mainly experienced after their children were in bed:
Participants described how other household members could prevent them getting comfortable, drawing on the desire for having space and privacy. In group 2 all participants drew upon their own experiences of this, as illustrated by Lewis:

**Lewis:** “Like sometimes when I go upstairs to crash on my bed it’s just because I don’t want to have to deal with other people as nice as they are, and they are nice flatmates but sometimes you just want your own space.”

Most participants noted later times in the evening for achieving comfort, making references to being able to sit down and relax once necessary tasks have been completed. However Maria felt comfort was achieved purely by being home and staying in:

**Maria:** “If I know I have to go out again for some reason I can’t really relax until I’m back and that’s it, you can get changed. I do like to get little things done like cooking dinner first but normally just being at home I usually go into comfort mode straight away.”

Watching television was referred to as an unwinding activity across both focus groups. It was usually coupled with other features of comfort such as comfortable seating. In describing her personal idea of comfort, as well as watching television, Sarah also drew upon the physical elements:

**Sarah:** “On the sofa with a blanket in front of the tele.”

Several participants emphasised they would watch television at specific times to watch a certain programme of interest or through catch-up television on the
internet, so that they can watch things when it is convenient for them; this is illustrated by Jessica who also stated that she avoids watching too much television:

Jessica: “I don’t really watch that much TV, or try not, and what I do like to watch it’s on catch up. So I never really, like I never know when anything’s actually really on TV.”

Comfort activities also included doing something completely different from work and feeling productive, mentioned by Lewis and agreed upon by Kevin. Unwinding activities mentioned included juggling, learning a new language and biking; Kevin stated:

Kevin: “I think similar to [Lewis], I’d like to have a slot where I can just learn something new, it could be something completely silly, it was juggling, it’s something that’s kind of probably a bit more physical to do with coordination than brain power because by the time you get home you’ve just had enough of all this stuff… things like biking, just something that’s almost trivial.”

When the topic of transitioning from work and home life was discussed, a majority of participants did not associate the commute as a time to do this, some stating that they do think about work at home or even working from home occasionally. Some participants pointed out their commute was short (10 minutes or less), others noted their type of work was not the type which they could think about outside of working hours. Walking and cycling appeared to be the modes of transport which best provided individuals with the opportunity to make this transition. Overall, responses were varied and discussions provoked individuals to share an array of experiences on comfort, household dynamics and everyday routines.
7.11.4.2 Day-in-the-life exercise

This exercise was completed with ease by all participants; some expressed how irregular their everyday life was, but were able to note the main activities of their after work routines. A majority of participants presented main activities in 30-60 minutes blocks of time; most chose to describe general routines, others chose a specific day (i.e. the day before) and gave details of the tasks and activities of that particular evening. In both focus groups, the exercise aided a discussion on how participants spent their evenings and what changes they would like to make. Figure 13 and Figure 14 presents the day-in-the life boards from Pauline and Mike.

When asked about possible changes they would like to make to their routine, the majority described were in reference to enjoyable activities, ways in which the participants would prefer to spend their time, for instance learning or improving on a skill such as learning a language, socialising or gardening. Also noted were activities which participants felt they should be doing such as studying and exercising. The quotes below illustrate how participants Lewis and Jessica described what they would like to add to their daily routines:

Lewis: “I’d like to add in an hour of more productive time. A few months ago, just after Christmas, I made myself do an hour a day of either Spanish or Portuguese because I was trying to learn... I wanted that as productive time.”

Jessica: “I want to fit in more time for my garden, and I’m going to have to now as I’ve got most of a veg patch in, so I’m going to have to make sure I get home in time to water every evening and that kind of thing.”
Figure 13: Pauline Day-In-The-Life Exercise

3.45 home from work
switch on plug to tumble dry - make cup of tea
relax in armchair till 5 o’clock.

5.00 take pills - wash up prepare kitchen for evening meal.
check washing in washing machine - tumble dry

6.30 husband comes home - make evening meal

7.00 Have dinner - watch news -
check emails - facebook

8.30 Watch TV - have coffee

11.30 Bed

Play on Wii machine
for exercises

Chilling

Not a lot!

Figure 14: Kevin Day-In-The-Life Exercise

19.00ish Get in, take shoes and tie off and have meal

19.30 Clear away meal stuff, tidy kitchen and wash up (if needed)

19.45 Do any chores (DIY etc), if none, go to study to use PC or do daily paper puzzles

21.00 Sit in lounge and watch TV

22.00 Make tea (for two!) continue to watch TV

23.00 - 23.30 Go to bed

A change:
Maybe join a Bridge Club to play regularly, an evening a week
In summer I will spend time in the garden, cutting grass, etc.
### 7.11.4.3 Comfort Activity Summaries

This study also served the purpose of identifying the activities which participants associate with comfort in order to recognise potential comfort activities in their daily routines in study 4. The comfort activities of householders which were identified through the focus group are presented in Table 10. Further comfort activities will be identified through study 4.

**Table 10: Participants Comfort Activity Summaries**

<table>
<thead>
<tr>
<th>Participants</th>
<th>Comfort Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maria</td>
<td>Warmth</td>
</tr>
<tr>
<td></td>
<td>Sitting on the sofa (with a blanket)</td>
</tr>
<tr>
<td>Eva</td>
<td>Quietness</td>
</tr>
<tr>
<td>Pauline</td>
<td>Comfy seating</td>
</tr>
<tr>
<td></td>
<td>Background noise from TV when alone</td>
</tr>
<tr>
<td></td>
<td>Warmth (in winter)</td>
</tr>
<tr>
<td></td>
<td>Cool (in summer)</td>
</tr>
<tr>
<td></td>
<td>Relaxing</td>
</tr>
<tr>
<td></td>
<td>Craft work, scrapbooking</td>
</tr>
<tr>
<td>Sarah</td>
<td>Watching TV</td>
</tr>
<tr>
<td></td>
<td>Sitting on the sofa</td>
</tr>
<tr>
<td></td>
<td>Blankets</td>
</tr>
<tr>
<td>Sade</td>
<td>Sitting down</td>
</tr>
<tr>
<td></td>
<td>Warmth</td>
</tr>
<tr>
<td></td>
<td>Having a Bath</td>
</tr>
<tr>
<td></td>
<td>Watching TV</td>
</tr>
<tr>
<td>Walter</td>
<td>Blanket on the sofa</td>
</tr>
<tr>
<td></td>
<td>Warmth</td>
</tr>
<tr>
<td></td>
<td>Comfortable clothing</td>
</tr>
<tr>
<td></td>
<td>Keeping doors shut</td>
</tr>
<tr>
<td></td>
<td>A drink (beer)</td>
</tr>
<tr>
<td>Kevin</td>
<td>Turning down the heating (as family turn it up)</td>
</tr>
<tr>
<td></td>
<td>Listening to music (enjoys more than watching TV)</td>
</tr>
<tr>
<td></td>
<td>Watching TV (flopping down on the sofa)</td>
</tr>
<tr>
<td></td>
<td>Listening to music whilst cleaning</td>
</tr>
<tr>
<td></td>
<td>Physical activities no activities which require too much brain power</td>
</tr>
<tr>
<td>Mike</td>
<td>Sitting comfort (on comfortable sofa)</td>
</tr>
<tr>
<td></td>
<td>Watching TV</td>
</tr>
<tr>
<td></td>
<td>Privacy from others householders</td>
</tr>
<tr>
<td></td>
<td>Gardening in the summer</td>
</tr>
<tr>
<td>Rachael</td>
<td>Snuggling on couch</td>
</tr>
</tbody>
</table>
### Participants & Comfort Activities

<table>
<thead>
<tr>
<th>Participants</th>
<th>Comfort Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Snuggling with cat</td>
</tr>
<tr>
<td></td>
<td>Read in bed</td>
</tr>
<tr>
<td></td>
<td>Sitting comfort (on comfortable sofa)</td>
</tr>
<tr>
<td></td>
<td>Privacy from other householders/time to oneself</td>
</tr>
<tr>
<td></td>
<td>Having a bath</td>
</tr>
<tr>
<td></td>
<td>Outside in the summer</td>
</tr>
<tr>
<td>Lewis</td>
<td>Privacy from others householders</td>
</tr>
<tr>
<td></td>
<td>Listening to music</td>
</tr>
<tr>
<td></td>
<td>Watching TV (especially football)</td>
</tr>
<tr>
<td></td>
<td>Lying on bed</td>
</tr>
<tr>
<td></td>
<td>Watching TV (via internet on laptop)</td>
</tr>
<tr>
<td></td>
<td>Playing the guitar</td>
</tr>
<tr>
<td></td>
<td>Just to relax</td>
</tr>
<tr>
<td></td>
<td>Washing up the dishes</td>
</tr>
<tr>
<td></td>
<td>Learning a new skill</td>
</tr>
<tr>
<td>Jessica</td>
<td>Cooking</td>
</tr>
<tr>
<td></td>
<td>Watching catch up TV (but not that often)</td>
</tr>
<tr>
<td>Olivia</td>
<td>Comfortable clothing</td>
</tr>
<tr>
<td></td>
<td>Background noise from TV when alone</td>
</tr>
<tr>
<td></td>
<td>Sitting down on the sofa</td>
</tr>
<tr>
<td></td>
<td>Iron whilst watching TV</td>
</tr>
</tbody>
</table>

#### 7.12 Discussion

The findings of this study identified some of the comfort making activities of householders and begun to consider comfort in the context of everyday home life. The scope of comfort activities showed several common themes, for example warmth, sitting comfort and watching television; this is also displayed in the personal summaries of comfort activity.

The findings support several aspects identified as creating comfort in study 1, in particular aspects surrounding thermal comfort such as adaptive ways to keep warm or seasonal differences in behaviour. Findings from study 1 identify several specific activities householders conducted to unwind; findings from the focus groups drew similarities to study 1, responses including activities such as reading or watching television. During the focus groups, householders drew upon various experiences of comfort in their everyday lives; this may have been facilitated by
also discussing after work routines during the session. Different hobbies were associated with the experience of comfort such as learning a new skill, it was also linked to the wider context of the householders’ day for instance householders expressing the need to do something completely different from their everyday job role. All activities whether low-effort (i.e. watching television, reading), physical or challenging (i.e. exercising, learning a new skill) discussed during the focus groups were ways to unwind after being at work and therefore contributing to the overall comfort experienced by householders. Both low-effort and physical activities after work are also known to have a positive effect on well-being (Sonnentag 2001; Sonnentag 2003).

Sessions discussed the negotiation of comfort within the everyday lives, drawing upon the ways in which necessary tasks were frequently combined with enjoyable tasks. The findings emphasise the dynamic features of home life, such as knowing the activity patterns of other householders, the responsibility of childcare and the management of time. These features also played a role in the experience of comfort; typically pushing comfort-making activities later, as necessary and essential tasks such as cleaning or cooking dinner were seen to take priority in after work routines. The day-in-the-life exercise encouraged participants to think about their daily routines and when creating comfort takes place. It also gave them the opportunity to consider what was missing from their everyday routines in some cases this appeared to comfort making activities such as being more productive and gardening.

7.12.1.1 Reflections

This study acted as a sensitisation stage for studies 3 and 4, it was an opportunity for participants to share their experiences of comfort and discuss comfort within the context of their everyday lives. This process used focus group sessions as a sensitisation tool which was more structured and provided analysable data unlike traditional sensitisation methods. The insights captured through this method were valuable in identifying householders comfort activities. Using a sensitisation tool suited the interpretive approach of this research; the variations of comfort
experienced were captured across both focus groups, emphasising the differences between individual interpretations of the lived experience. The approach prepared participants for the in-depth nature of studies 3 and 4 by briefing and discussing the key topics.

Group discussions played a vital role in drawing out comfort activities from all participants, for instance almost all participants in group 1 felt warmth was a part of creating comfort, whilst in group 2 all participants agreed that privacy or time to oneself was important to feeling comfortable. The day-in-the-life exercise successfully engaged participants in the topic of daily routines, the A3 whiteboards were a useful tool for presenting the routines to the group and in adding an element on fun to the activity. The focus group included briefing participants on study 3 and 4; it offered participants the opportunity to ask questions which were helpful for other participants. This would not have been the case if participants were instructed in a one-to-one setting, therefore briefing also benefitted from the focus group sessions.

Participants were recruited for the study through a purposive sampling strategy which resulted in the researcher having various different associations with all the participants from work colleagues to family friends, and in some cases participants also knew each other. Subsequently, the focus groups were friendly environments for participant interactivity. The researcher was able to gain trust and build a rapport with all participants which in turn was valuable for the in-depth nature of studies 3 and 4.
Chapter 1: Introduction

Chapter 2: Literature Review

Chapter 3: Research Paradigm

Chapter 4: Methodology

Chapter 5: Exploring Householders’ Perspective of Comfort in the Home

Chapter 6: Household Profiles

Chapter 7: Insights into Comfort and Daily Routines

Chapter 8: Exploring Psychological Dimensions of Comfort in the Home

Chapter 9: Capturing Comfort in Context

Chapter 10: Discussion: A Classification of Domestic Comfort

Chapter 11: Conclusions and Future Work

Chapter 12: References

Chapter 13: Appendices
8 Exploring Psychological Dimensions of Comfort in the Home

8.1 Introduction

As outlined by the literature, comfort research traditionally focuses on the physical elements especially thermal comfort. However there is growing acknowledgement and research into the social and psychological attributes to the experience of comfort, such as research into adaptive thermal comfort and the growing need to understand the complexity of comfort for the purpose of reducing householders’ energy consuming behaviour (Centnerová & Boerstra 2010; de Dear et al. 1998; Moezzi & Lutzenhiser 2010).

The findings of study 1 identified a broad scope of attributes householders’ associated with the meaning and the creation of comfort which were categorised into the four main themes, environmental and physical comfort, aesthetics and perceptions of space and order, psychological wellbeing and interactions and activities. The themes included the identification of attributes which were more commonly associated with a traditional notion of comfort such as warmth and sitting comfort in environmental and physical comfort, as well as other aspects which were less common such as home security in psychological wellbeing and adaption of space in aesthetics and perceptions of space and order. The findings from study 2 explored these themes further with examples from every day home life to illustrate the multiple dimensions associated with domestic comfort; however both studies focused on breadth rather than gaining in-depth data of the comfort dimensions. This study focuses on exploring in-depth, the psychological dimensions of comfort as outline by Heijs and Stringer (1987).

8.2 Study Aims

The study aims to address the following research objective:

- Investigate the key psychological dimensions of comfort from the perceptive of householders.
The findings of this study will provide further data on the psychological aspects of comfort and subsequently contribute to a classification of domestic comfort.

8.3 Study Rationale

The purpose of this study was based on the outcome of studies 1 and 2 which identified a wide scope of attributes associated both with meaning and creating comfort at home including aspects which were less typically associated with the traditional notions of comfort. This study will explore the lesser known aspects of comfort in particular the psychological aspects of comfort, building on the data gathered in studies 1 and 2, further identifying how the home environment is used to achieve comfort of this nature.

In studies 1 and 2 participants touched upon the lesser known aspects of comfort; this was often after prompting and still a majority of responses were strongly associated with the physical aspects of comfort; given the challenge of exploring the psychological factors of comfort, Heijs and Stringer's taxonomy of comfort was used to extract data on the psychological nature of comfort. Sharing the forestructure of understanding with participants is a technique frequently used within interpretive phenomenology, particularly when exploring a phenomenon which is ingrained within the everyday lived experiences (Plager 1994). Environmental psychologists Heijs and Stringer (1987) identified four social and psychological factors of comfort which can be achieved if the property possesses the necessary qualities. These were recognised as perceptual comfort, interactive comfort, personalisation comfort and facilitative comfort (see chapter 2: Literature Review for further details). These four factors of comfort are used to guide the data collection process reported in this chapter and as a result, the following research questions are asked:

2) What are the psychological factors which frame comfort and how is the home environment used to create them?
3) Heijs and Stringer (1987) identified four social and psychological dimensions of comfort; can an exploration of these factors in modern UK households provide a greater understanding of how (holistic) comfort is experienced?

8.4 Methods

It has been established through the research so far that comfort for householders has personal nature. With this in mind the chosen methods were required to access data which was detailed, personal, and unique to each householder.

Using cultural probes was considered as a tool to do just this. Probes are a self-reporting method where participants are provided with a selection of materials such as postcards, cameras, maps, etc to engage participants in activities designed to gain a deeper insight into their everyday lives. This approach, developed by Gaver, Dunne and Pacenti (1999), was used to discover new concepts within established fields. In one study conducted by Gaver and his colleagues (2004) cultural probes were used to explore the importance of technology at home. The pack included a disposable camera, maps and space to record their dreams. Gaver admitted that the photos collected in the process were near impossible to interpret as they were not accompanied with any descriptions or reasons from the respondents therefore the researchers could not be certain of the significance (Gaver et al. 2004). Since their development, cultural probes have become a popular tool within academic and industrial research, however Gaver criticises the attempt to obtain traditional and manageable data from probes which was never the purpose of their design. The purpose of this study was to understand householders’ experience of comfort and contribute towards the research aim to develop a classification of domestic comfort, therefore it was fundamental that the data collected could be interpreted and collated into meaningful themes.

A photo elicitation method was chosen as an appropriate method to achieve the aims of this study. The method was conducted for the purpose of eliciting images representative of householders’ experience of comfort and, as the viewer of the images, be able to share in their interpretation through the following interview process (Harper 2002). One of the key reasons for using this method, was to have
as little influence on householders understanding of their experience of comfort, however research has shown when participants are given little to no guidance during data collection it can affect the quality of the findings (Kuijer & Jong 2009). Therefore it was considered best practice to provide them with some form of guidance in order to gain the most of the photo elicitation method. The taxonomy of four social and psychological factors of comfort developed by Heijs and Stringer (1987) was applied to guide the data collection process. This was considered to be an appropriate taxonomy to help extract data which is specific to the areas of comfort; it was specifically developed for domestic comfort, and covers a wide range of characteristics. The taxonomy outlines perceptual, interactive, personalisation and facilitative comfort which can be achieved if the home possesses the necessary qualities. Combining the photo elicitation method with Heijs and Stringer’s four factors of comfort aimed to draw participants’ attention towards these specific forms of comfort whilst also offering flexibility to capture householders’ unique understanding and creation of comfort in their home. See section 4.4.3 for further details on the photo eliciting method.

8.5 Sampling

A purposive sampling strategy was used to recruit individuals for this study as outline in chapter 7 (sampling section 7.5). Qualities of the four dimensions outlined by Heijs and Stringer included element of freedom to change surroundings and to personalise the home. With this in mind, recruitment focused on homeowners, as they are more likely to have this freedom, over those who rent. The recruitment criteria are set out in the previous chapter, as the same participants took part in this study.

8.6 Piloting

As previously stated, a pilot was conducted of all stages of the data collection process (the focus group, photo elicitation section and tools for capturing comfort). Participants followed the guidelines for capturing images of their home environment, for the pilot interview. Questions were developed based on the
images they had captured, which gave the opportunity to ask for feedback on the data collection procedure. After the pilot study was completed the procedure was deemed appropriate to use and there were no changes made to the procedure.

8.7 Design of the study

The photo elicitation process was designed to gain further insight into householders’ experience of psychological aspects of comfort. In doing so, four categories of comfort identified by Heijs and Stringer (1987) were used to give participants some form of direction and to avoid uncertainty with using the method. The four categories were derived from a conceptual analysis of the literature in the home by Heijs and Stringer, who identified personalisation comfort, perceptual comfort, interactive comfort and facilitative comfort (further details of each category are given in Chapter 2: Literature Review). Participants were given the option to take up to three photos which aligned with the four categories. In total participants could capture up to fifteen images, with details shown in Table 11.

<table>
<thead>
<tr>
<th>Factors of Comfort</th>
<th>Guidance</th>
<th>No. of Photos</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Take a photo of an area or item of your home where you...</td>
<td></td>
</tr>
<tr>
<td>Interactive Comfort</td>
<td>Can have privacy</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Can be social</td>
<td>3</td>
</tr>
<tr>
<td>Personalisation Comfort</td>
<td>Have been able to personalise to your taste</td>
<td>3</td>
</tr>
<tr>
<td>Facilitative Comfort</td>
<td>Carry out activities you enjoy</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Carry out activities which are necessary</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Can adapt the space</td>
<td>1</td>
</tr>
<tr>
<td>Perceptual Comfort</td>
<td>Can get comfortable</td>
<td>3</td>
</tr>
<tr>
<td>Total Number</td>
<td></td>
<td>15</td>
</tr>
</tbody>
</table>

Table 11: Guidance for Photo Elicitation Method
Participants were provided with bespoke booklets to record data, the section corresponding to this study was labelled the *photo album* section. This included guidance for taking photos, including space to describe the photos, and questions to elicit further details of why and how the area or object is used for comfort; this added further contextual information and also avoided the researcher misinterpreting the images captured by the householder (Croghan et al. 2008). The record book also included instructions for delivering the photos to the researcher.

![Figure 15: Participants Record Book](image)

Keeping in mind the focus of the research is comfort in the home, it was determined that the photo elicitation interview would take place in participants’ homes which would maintain an engagement with the topic (Elwood & Martin 2000; Herzog 2005). The interview took a semi-structured approach; with open-ended questions regarding their experiences of comfort at home, probing questions were also designed, based on the images and responses to the questions asked in the record book, a full list of question can be found in appendix F.

### 8.8 Ethics

As stated in Chapter 4: Methodology (section 4.8) Loughborough University ethical guidelines were followed, an ethical checklist was completed; full ethical approval was not required for this study.
8.9 Equipment

Each participant was provided with a record book, with the section labelled ‘Photo Album’ corresponding with this study. Providing all participants with disposable digital cameras was considered but, for quality purposes and to allow participants to review their images prior to collection, they were instructed to use their own digital cameras and were given the option to borrow a camera if necessary. Once they had captured the photographs they were asked to send them via email, or by flash drive; again a flash drive was provided if required. During the interview stage of the process, the captured photographs were displayed using a laptop so that they could be discussed alongside the participants’ completed record book.

8.10 Procedure

The procedure followed for this study can be divided into four stages: briefing, capturing, reviewing and interpreting the data. The briefing stage took place in the focus group described in chapter 7; each participant attended one of two focus groups where they were briefed on the stages of both this study and study 4. The record books were given to participants and the researcher went through how to complete each stage of the study. This gave participants the opportunity to raise any queries regarding the process. In the second stage, participants captured the images for this study and completed the corresponding questions in the record book. Once participants had completed the photo album section (and the sections for study 4), the record books and images were collected and reviewed by the researcher, in order to develop probing questions for the interview stage. This also allowed the researcher to familiarise themselves with the data beforehand. The final stage of the procedural process involved interpreting the images through the photo elicitation interview; the images which were captured were discussed further with participants, allowing participants to give further information on the meaning and their experience of different areas of their home, thus allowing a shared interpretation of the images to be formed between participant and viewer. Figure 16 illustrates the stages of data collection.
8.11 Data Analysis

As an exploration of the four dimensions of comfort was key to the research objectives, and had been applied to the design of the photo elicitation stage, it was only appropriate to use the four categories to provide a template for data analysis. The template analysis process which was followed has been detailed in Chapter 4: Methodology (see section 4.5.1.1.), the initial template was developed after an extensive review of the four dimensions. The key aspects were identified for the initial template, and broad, high level codes were created, these are shown in Table 12. Coding was revised during the data collection process including the insertion of new codes which fitted under the four high-level themes, and the deletion of codes which were not found to be supported by the data collected.
### Table 12: Study 4 Initial Coding Template

#### 1. Interactive Comfort

1. **Interactive Comfort**
   - 1.1 Freedom to choose between socialising and privacy
   - 1.2 Privacy from the outside world
   - 1.3 Privacy from householder’s
   - 1.4 Have a separate room from other householder’s
   - 1.5 Sufficient space to socialise with others
   - 1.6 Designated rooms for various functionalities
   - 1.7 Surrounding area of residency should not be crowded or over populated.
   - 1.8 Layout of home for social interactions

#### 2. Personalisation Comfort

2. **Personalisation Comfort**
   - 2.1 The process of making a house a home
   - 2.2 An occupant or occupant’s ability to stamp their personality on it.
   - 2.3 The process of residents bonding with dwelling
   - 2.4 Having space for keepsakes including storage space (elements of facilitative comfort)
   - 2.5 Restrictions in rental/council properties to achieve personalisation comfort.
   - 2.6 Identifications on the outside of the property (recognisable and ‘territorial markers’)
   - 2.7 Status and personalising a home can have various socio-cultural differences (future work)

#### 3. Facilitative Comfort

3. **Facilitative Comfort**
   - 3.1 Carrying out activities which are desirable
   - 3.2 Carrying out activities which are necessary
   - 3.3 Adaptation of space to meet needs/desires the multi-functionality of a room
   - 3.4 Freedom of action in respects of their householder’s
   - 3.5 The ‘extra space’ available for adapting room for various activities
3.6 How items are organised by functions in the home
3.7 Extensions made to the property
3.8 Accessibility of rooms in the home
3.9 Ability to make changes/repairs to the property
3.10 The ‘activity-patterns’ of householder’s

### 4. Perceptual Comfort (3 types of perceptual comfort)

4.1.1 Perceptual Organisation
4.1.2 Afforded behaviour by the surrounding stimuli
4.1.3 Layout of room – grouping of similar stimulus
4.1.4 Preferred stimuli should be prominent in a room.
4.2.1 The perceived dimensions of an environment based on subjective judgement
4.2.2 Structure and complexity of a residential environment
4.2.3 Amount of interaction between others
4.2.4 The functionality of the environment and instrumentality
4.2.5 Décor of rooms
4.3.1 The necessary elements for the experience of comfort
4.3.2 ‘Comfort words’ (cosy, spaciousness)

### 8.12 Findings

#### 8.12.1 Background Information

The full background information for each participant has been presented in Chapter 7: Insights into comfort. A summary of codes and participant information has been included below in Table 13, as a reminder:
### 8.12.2 Four Factors of Comfort

The findings are divided into each section of the four psychological factors of comfort. After discussion of each of the four factors, there is a section on secondary coding which presents the interlinking between the four factors. This is in line with Heijs and Stringer's account of the four factors, in which they make several references to each factor having qualities which were not necessarily exclusive to one factor.

<table>
<thead>
<tr>
<th>Participant Name</th>
<th>Gender</th>
<th>Age</th>
<th>Number of Householders</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maria</td>
<td>Female</td>
<td>29</td>
<td>2 adults</td>
</tr>
<tr>
<td>Eva</td>
<td>Female</td>
<td>48</td>
<td>3 adults, 1 children</td>
</tr>
<tr>
<td>Pauline</td>
<td>Female</td>
<td>56</td>
<td>2 adults</td>
</tr>
<tr>
<td>Sarah</td>
<td>Female</td>
<td>50</td>
<td>2 adults</td>
</tr>
<tr>
<td>Sade</td>
<td>Female</td>
<td>27</td>
<td>3 adults</td>
</tr>
<tr>
<td>Walter</td>
<td>Male</td>
<td>58</td>
<td>2 adults</td>
</tr>
<tr>
<td>Kevin</td>
<td>Male</td>
<td>45</td>
<td>2 adults, 2 children</td>
</tr>
<tr>
<td>Mike</td>
<td>Male</td>
<td>63</td>
<td>2 adults</td>
</tr>
<tr>
<td>Rachael</td>
<td>Female</td>
<td>35</td>
<td>2 adults, 2 children</td>
</tr>
<tr>
<td>Lewis</td>
<td>Male</td>
<td>25</td>
<td>3 adults</td>
</tr>
<tr>
<td>Jessica</td>
<td>Female</td>
<td>28</td>
<td>3 adults</td>
</tr>
<tr>
<td>Olivia</td>
<td>Female</td>
<td>26</td>
<td>2 adults</td>
</tr>
</tbody>
</table>
8.12.3 Interactive Comfort

8.12.3.1 Privacy in the home

Participants were asked to ‘take photos of up to 3 areas in your home where you can have privacy’. The photos captured by participants covered areas of their home, most of which were personal areas such as bathrooms and bedrooms. Eight out of the ten participants chose to capture images of their bathrooms, whilst six captured images of bedrooms, referring to the need for privacy for tasks which require them to be in a separate room from others, such as using the toilet, bathing, or getting dressed (see Figure 17). Also being able to close or lock doors appeared to be a significant factor in the experience of privacy and for some personal tasks, it was felt necessary:

![Figure 17: Maria, Bedroom, Interactive Comfort](image)

Maria: “It is a separate room, the door is usually shut, especially if there are visitors. It is a private place that I feel comfortable and I treat it different from other rooms e.g. the living room. Need a private space for personal things e.g. getting dressed.”

There was also acknowledgement that there are tasks which both the participants and other household members would not wish to share. Kevin stated:

\[Kevin: \text{“Close or lock the door... plus the family don’t need/want to go in there when I am on the loo.”}\]

In addition to closing or locking doors, participants also achieved privacy by isolating themselves from other household members [Maria, Pauline, Kevin, Lewis, and Jessica]. One participant also expressed that by leaving their phone outside the bathroom it made them feel cut off, a feeling which was desired for their privacy:
Participants also experienced privacy from the outside world by using a visual barrier such as blinds or curtains at windows which overlooked the street [Eva and Kevin], Kevin expressed privacy was the only reason he put blinds up in the front room:

Kevin: “Yeah I think we’re more into, open bright and airy… well the difference actually in the front room, we’ve put blinds in just for privacy purpose but there’s no point at the back of the house because nobody

Although a majority of the images captured for privacy were of non-communal areas, a small number of participants experienced privacy in shared areas of the home like the kitchen and living room [Eva, Kevin, and Mike]; Eva also indicated the need for quietness:

Eva: “This area can be quiet at certain times so that I can have some privacy. There are blinds at the bay window which can be closed when appropriate.”

In describing how and why they used various areas of their home for privacy, participants identified activities which they engaged in when having time to oneself, for a range of purposes such as relaxation, hobbies or work [Pauline,
Rachael, Jessica, and Olivia]. Some participants discussed bathing for the purpose of relaxation and the importance of the having privacy in order to do this [Rachael, Jessica, Olivia]. One participant [Rachael] had young children and found the need for private time particularly beneficial for her wellbeing:

![Figure 20: Rachael, Bathroom, Interactive Comfort](image1)

Rachael: “*In the bath. Lock on door! Warm, comfy, relaxing radio in bathroom as well.... [Interview stage] I think certainly since having the kids there are times when you just want to go, just leave me alone for five minutes... being able to go into the bathroom especially kind of feels like, right, this is my time you know I'm just going to ignore everything, put the radio on so I can't even really hear anything, it's just like [sighs] nice.*”

The bathroom appears to provide a ‘safe zone’ for some participants to relax; similarly participant Olivia stated the following:

![Figure 21: Olivia, Bathroom, Interactive Comfort](image2)

Olivia: “*I can shut myself in the bathroom to relax in a hot bath. A hot bath relaxes me and makes me feel like I'm looking after myself!*”

Privacy was also important to participants who were studying or needed to complete work from home [Maria, Walter, Kevin and Mike]. Privacy was driven by the need for a quiet environment and in all cases, a separate room from other householders. One participant [Kevin] further stated how they would let other household members know that he required privacy:
Another participant [Lewis] also associated quietness with privacy; in regards to his bedroom he stated it was the only place where he could experience true privacy [Lewis] but also noted how sound travels:

Lewis: “The bedroom is the only place where I can just shut my door and have true privacy, even though I can still hear the neighbours or anything else going on in the house.”

The dimensions of the space in regards to privacy have been noted by a number of participants [Maria, Pauline, Kevin, and Rachael], attributing the small size of the room to the feeling of privacy (see Figure 22: Kevin, Study, Interactive Comfort).

8.12.3.2 Socialising at Home

For this task, a majority of participants’ captured images around their homes of areas where they socialise with other householders and guests when entertaining [Maria, Eva, Pauline, Walter, Kevin, Mike, Rachael, Lewis, Jessica, Olivia]. The layout of the home, the dimensions and behavioural affordance of the room, the person(s) to interact with and the type of social activity desired were intertwined characteristics which allowed participants to create positive social interactions in their homes. Various qualities from seating, food and entertainment were desired for engagement in social activities, some rooms could be arranged for use with different types of social groups and different interactions (e.g. family visits or parties). Some participants listed these varying components which were experienced for social comfort [Maria, Pauline, Walter, Jessica, and Olivia]; Pauline
described social comfort in her living room, she also noted the physical comfort
elements (seating and warmth) as significant to this experience:

Pauline: “We have a sofa & two armchairs, a warm fire and TV, so all you need to be social. We also have a music system so you can play your own music, but is also large enough to have toys down to play with the grandchildren when they wish.”

Figure 23: Pauline, Living Room, Interactive Comfort

Social activities surrounding food were prominent amongst participant responses; shared dining and shared cooking, such as family dinners or barbequing, were ways people socialised with both householders and guests [shared dining Eva, Pauline, Walter, Mike, Rachael, and Jessica; cooking Lewis, Jessica and Olivia]. Eva noted how food encouraged social interactions:

Eva: “I can be sociable here because there is a dining table where food can be served. Food always enables people to be sociable. There are 6 seats around the table which provides a comfortable area for people to have something to eat. I use this area to be sociable because it is near the kitchen. People can have my meals/drinks and can eat at ease in a leisurely way.”

Figure 24: Eva, Dining Area, Interactive Comfort

Shared cooking was discussed in a similar way to shared dining, food acting as an aid for positive social interactions, Jessica described the ease in which social interactions occurred:
The social interactions afforded by consumer electronics were also captured; participants described how watching television together, shared gaming or music were social activities they conducted [Maria, Pauline, Walter, Kevin, Rachael, Lewis, Jessica, Olivia]. The use of these devices appeared to bring families together regardless of age. A majority of the time participants stated one area in which all of these functions were possible, as Walter describes:

**Walter:** “This room is used to watch TV, listen to music and play games with family and friends. This room is very spacious and good for entertaining people.”

Whilst Kevin’s back room appears to be used purely for his children to play computer games (and sometimes himself):
A majority of images captured were of communal spaces: kitchens, dining rooms, living rooms and conservatories; these rooms afforded different social behaviours depending on the prominent functions of the room. Both the ease of social interactions and the fluidity of social movement from room to room were described by participants [Eva, Pauline, Walter, Kevin, Rachael and Jessica]. Kevin describes the ease of social interaction between him and his family in the kitchen:

Kevin: “Back room (messy), sofas and Xbox (opposite the sofa) I can go in there with my boys and play computer games (not very often though!”

The fluidity of social movement between rooms seemed particularly important when socialising with guests. Walter described how he expected all three communal areas to be used when entertaining:

Walter: “It depends what you want to do if you want to do, want to watch TV you go into the front room, if your cooking you stay in the kitchen, dining room when you’re eating.”
The subjective judgement of dimensions of rooms for social comfort were frequently referred to as being ‘big’ and ‘spacious’, in contrast Pauline compared how her smaller dining room felt cosier than the conservatory, providing variation in atmosphere:

Pauline: “When there is only a few of us it’s good to go into the backroom & the small dining table, cosier and not so formal as the large dining room in the conservatory. It is bright and light, looking out onto the garden.”

Figure 29: Pauline, Dining Room, Interactive Comfort

8.12.3.3 Sub-fields of Interactive Comfort

Some of the strongest sub-fields of interactive comfort were facilitative in nature. The engagement of householders in desirable activities, the grouping of items of similar function, the ability to make changes to their homes and the adaption of the space were all significant qualities in the experience of interactive comfort. Participants described engaging in activities which they also noted as desirable during private and social comfort, for instance Lewis uses the privacy of his bedroom to play the guitar, and also noted playing the guitar as a desirable activity. Discussions of the multi-functionality of spaces and the grouping of similar functioned devices are attributes of facilitative comfort which were also significant for social interactions as previously discussed (Figure 23 and Figure 26). Walter provided an instance of this when describing social interactions in his living room (see Figure 26). Furthermore certain participants were able to enjoy a better quality of social interaction with the addition of conservatories to their properties.

Characteristics of perceptual comfort were also expressed in participants’ responses to interactive comfort. Participants had a tendency to describe private spaces as small and cosy and social spaces as large and spacious, pertaining to the perceptual dimensions required for the desired interaction (see Figure 22: Kevin,
There was also the need for quiet environment in certain private areas for work or studies, a quality which is also perceptive in nature.

8.12.4 Personalisation Comfort

Personalisation comfort gave participants the opportunity to describe how they bonded and added their own personal taste to their home. Eleven participants chose to capture images of various ways in which they had personalised spaces in their home including choices in décor and furnishings, aesthetic pieces and displaying photographs. Having a décor which reflects the taste of the individual or household was important and participants had actively been a part of the decision process; Maria described how she had considered the dimensions of the room, natural lighting and relaxation when decorating her living room:

![Figure 30: Maria, Living Room, Personalisation Comfort](image)

Maria: “I’ve personalised this area through my choice of furniture, decor and colour. I’ve used bold and neutral colours, which helps me to relax. It also makes the most of the light that comes into the room, which I like. I also chose a sofa that fit neatly into the corner of the room and enabled me to relax by having a range of seating positions. I’ve personalised the area because it is my home and I wanted a space to be able to relax in.”

Olivia also explained how she had thought about the décor and furnishings of her study room in order to provide motivation to do her work:
With participants who lived with their families, the decision to decorate was shared so that the surroundings were suitable for all [Eva, Pauline, Walter, Kevin, Mike, and Rachael]. Eva explained how:

**Eva:** “Every room/area in the house is for all to enjoy… if I personalise I’d have all my ornaments all displayed and I keep saying to the children I can’t wait till you guys get older, and I’d have all the rugs back that I used to have. But when you’ve got kids I have to fit the house around them, I think that’s so important.”

Of the participants who were making shared decisions, half of them also expressed the lack of decisiveness or urgency to personalise their home [Walter, Kevin, and Rachael]. In addition they noted as long as the décor wasn’t unappealing then it did not negatively impact on them. Rachael, in discussion on personalising her home, stated:

**Olivia:** “I redecorated and furnished the room. I love NYC, have spent a lot of time there and would love to live there. I liked the style and lightness of white and lime green for my office - it’s calming. I made the pictures on the wall from my own photos and a subway map. I wanted a study I would like to sit in to work, I can sit on the sofa to read or use the desk computer. It makes me happy to look at memories and motivates me to work to finish and move on. New York makes me feel confident so this reminds me of that feeling - sounds stupid!”

Figure 31: Olivia, Study Room, Personalisation Comfort
Overall, a majority of male participants [Walter, Kevin, and Mike] expressed less interest in the décor of the home than the female participants, some stating that they let their partners lead the decision, Walter said:

Walter: “The décor, oh no, I leave that to my wife, the decoration.”

Interviewer: “So do you think that it’s more important to your wife?”
Walter: “Definitely yeah.”

The aesthetic pieces and keepsakes which participants placed around their home added individuality and reminders of significant life events; these ranged from photographs, souvenirs from travels, and items of personal attachment [Pauline, Sarah, Kevin, Mike, Rachael, Jessica, and Olivia]. These pieces added uniqueness to their homes; Pauline displayed photographs she had taken of a tree in a local park over the year, demonstrating the attention played to personalising:
Unique designs were also partly the motivation for Kevin’s ‘retro/industrial’ styled kitchen in which he displayed keepsakes from his grandfather:

**Kevin:** “Metal advertising signs high up on a wall in the kitchen
When we decorated/rebuilt the kitchen, I left the wall blank brick and put some old signs up that I had got from my grandfather.
I like the retro/industrial style and thought they would look good and a bit different to the usual boring suburban house.”

Maria, Pauline, Sarah, and Walter captured images of places where they personalised by being able to create their own space and have an area where it is predominantly for their possessions. This type of personalisation was expressed by Walter who had also stated he had built his shed himself:

**Pauline:** “I helped my husband decorate the hall 3 years ago and as we both loved the tree wallpaper and decided it would be nice to photograph the tree in the park down the road throughout the year so we could have photos of spring, summer, autumn & winter.
I felt that it made the hall decorating complete, and is a good record of the tree in the park.”
8.12.4.1 Sub-fields within Personalisation Comfort

Strong links were identified between personalisation and perceptual comfort, as participants described different areas of their home, sharing their perceptions of the environment based on the décor, furnishings, etc. Part of the process of turning a house into a home is to decorate it to one’s taste. In describing this, a range of perceptual qualities were identified; order, tidiness, the subjective judgement of the spatial dimensions and through the use of emotive language in describing their experiences of comfort.

Having order and things in their place was significant to those participants who had created their own space for their possessions. A good example of this is provided by Walter describing his shed shown in Figure 34. However, cluttered or ‘messy’ areas were also seen as personalised as this was their way of stamping their mark on their property; Rachael, in reference to her inertia towards redecorating and personalised her home, stated:

**Rachael:** “Well I kind of feel, it’s got our stamp all over it [in reference to the children toys and books on the living room floor]. I mean if it was horrendous and I really didn’t like it, then yes I would change it, but I kind of go well it’s fine there’s nothing about it that I dislike so.”

To be able to personalise their homes, participants benefited from the ability to make changes or repairs to their property when required. Those who had decorated their homes themselves or had major construction work completed may
have had a greater level of facilitative comfort than those who could not due to financial reasons or restrictions on the property. In fact in one case there appeared to be conflict between elements of facilitative and personalisation comfort; Kevin explained that after doing much of the renovation work on his home himself, he was less inclined to hang photos in his hallway:

Kevin: “... this is a slight cause of conflict because I quite like not having lots of stuff around. I think it’s partly because I in effect, apart from the building work but, I’ve done the whole house so I kind of feel like I’m damaging it by sticking things on the wall... it’s all looking quite nice and I don’t like banging things in the wall. So you know and I quite like having the photos up there but I’m not that bothered, she [his wife] kind of wanted them somewhere.”

Very few incidences of interactive qualities occurred where some participants had decorated private spaces for which they were the main or sole user; Figure 34: Walter, Shed, Personalisation, provides an example of this.

8.12.5 Facilitative Comfort

To capture aspects of facilitative comfort, participants were asked to take photos of different areas of their home where they have adapt the space, where they can carry out activities they enjoy and activities which are necessary. Participants captured adaption in the home in terms of creating extra space, changing the prominent function of a room and having multipurpose spaces. Several participants discussed how they were able to move furnishings around to create ‘extra space’ for carrying out certain activities. The adaption of the space tended to be for activities which were infrequently performed such as entertaining, exercising or home projects [Maria, Kevin, Mike, Rachael and Jessica]. Mike stated how he had been able to extend his home with a conservatory some years ago and was able to use this space for a variety of activities including as a dining room when entertaining:
In some cases participants were able to change the prominent function of a room, by transforming the space, through the use of adaptable furniture [Maria, Pauline, Sarah, and Olivia]. Pauline described her ‘back room’ as also being several other rooms, the dining room, spare room and computer room; she was able to adapt this space from its usual use as a dining room into a spare room by converting the sofa into a bed, and into a computer room by opening up the cabinet. It depended on what was required to how the room would be arranged; certain functions could be easily hidden:

Mike: “Added extra room to the house. Used as ‘outside’ sitting room. Reading, entertaining, ‘door step’ to the garden. We have cleared the space and used it as a dining room or, as the doors from lounge can be fully pushed back, extended the lounge/dining space.”
Participants identified areas where had the space to carry out activities they enjoyed [Eva, Pauline, Walter, Kevin and Mike] and also the area holding the objects (crafts table, TV, games etc.) they required for enjoyment, of which some rooms were multi-functional in nature [Maria, Kevin, Rachael, Lewis, Jessica and Olivia]. Jessica stated how her conservatory was the place where she was able to engage in several different types of activities which she enjoyed, they varied in interaction with others and skill, but the conservatory was a space which held all the necessary tools to carry out these various activities:

Pauline: “I have decorated our dining room (backroom) so that my husband and I have a space for us to eat our evening meal. We both like using the computer and so therefore we like it to be downstairs and easily accessible, but we also like to use the dining room as a spare bedroom when all the family stay with us. The sofa bed is comfortable as a sofa and an occasional bed, and the computer can be closed off so that it is not in the way when guests are here. This makes a very versatile space in our house, for us and our guests.”

Photos:
1 Dining Room
2 Spare Room
3 & 4 Computer Room (closed & open)

Figure 36: Pauline, Dining Room, Facilitative Comfort
Jessica: “I often watch TV and films in here. There is a Wii but I don’t play it as much as I would like. I have an electric piano I like to play. I also have lots of board games but again I don’t find as much time to play games as I would like. I enjoy socialising and this room is perfect.”

Figure 37: Jessica, Conservatory, Facilitative Comfort

Whilst Lewis described how he could enjoy several activities from the comfort of his bedroom:

Lewis: “This is the area I use the most. I use it to relax either watching TV, reading, or playing the guitar.”

Figure 38: Lewis, Bedroom, Facilitative Comfort

As previously mentioned having the space to carry out enjoyable activities was also considered by participants, Eva described how the rug on her living room floor provided her family with space to play games:
Finally, necessary activities were captured as aspects of the third part of facilitative comfort. The necessary activities which were captured were often associated with chores around the home, six participants discussed the kitchen as being somewhere they could carry out the required washing, cleaning or storage of cleaning products, Olivia noted the importance of keeping her products organised:

Olivia: “The cupboard under the sink has all my cleaning stuff, bin bags, fish food etc. It stores all the ‘domestic' stuff I need to do cleaning, washing, bins etc. I don't like cleaning products to be out in the rooms - this way the rooms look nice, it's organised and I don't always have to look at them reminding me I need to clean!”

Some participants discussed combining necessary activities with other activities which they enjoyed, i.e. listening to music or watching television to make them more enjoyable [Maria, Pauline and Lewis]. As Pauline stated about ironing in her living room:

Eva: “My family and I use this part of the lounge to play and have fun. There is a large red rug on the floor and it is a fantastic play, to engage with boxed games. We play dominoes occasionally as the children and I enjoy this game very much.”
8.12.5.1 Sub-fields of Facilitative Comfort

Adapting the space was regularly motivated by the desire for social interactions with the household or guests. Participants described the need to create extra space to accommodate guests or social activities. This was also true of the identification of spaces where they could carry out enjoyable activities; there were instances of social interactive activities. Cases of this have previously been discussed, Mike explained how he could adapt the space of his conservatory when entertaining (see Figure 35: Mike, Conservatory, Facilitative) whilst Jessica stated how she could use her conservatory for several different desirable activities.
To some extent the need to adapt spaces for social activities also has a connection to perceptual comfort because participants make a judgement of the spatial dimensions. A good reference of this was given by Pauline who took the size of the room into consideration when using adaptive furniture (see Figure 36: Pauline, Dining Room, Facilitative). Additionally perceptual organisation of certain areas was important for adaption and having a space which allows you to carry out both necessary and desirable activities; Olivia described how keeping her cupboard under the sink organised allowed her to be able to carry out necessary activities (see Figure 40: Olivia, Kitchen Cupboard, Facilitative).

8.12.6 Perceptual Comfort

Participants were asked to capture areas of their home ‘where you can get comfortable’. They were asked to describe how and what signified comfort to them in order to gain a detailed description of their personal notion of comfort. As previously detailed in the literature review, Heijs and Stringer (1987) identified three types of perceptual comfort; 10 participants chose to capture ‘getting comfortable’ indicating a composition of these three forms of perceptual comfort were experienced. The first type of perceptual comfort which Heijs and Stringer described referred to the afforded behaviour by the surrounding environmental stimuli and the effectiveness of producing the desired comfort experience. Participants did make reference to this type of behaviour [Maria, Eva, Pauline, Walter, Kevin, Rachael, Lewis, Jessica and Olivia], a majority of which were in reference to bedrooms and living room areas where the bedding or seating afforded the subsequent lying or sitting position they took to achieve comfort. Participants discussed getting into bed [Maria, Pauline, Walter, Rachael, Lewis, Jessica, and Olivia], and in a majority of cases doing another activity; Rachael noted how she was able to sit and lie in a variety of positions and carry out a number of activities she loved from her bed:
Similarly to lying in bed, sitting was also something which was accompanied by other activities, again reading and watching TV were the main activities which participants discussed. Walter referred to sitting on the sofa and watching TV to relax:

Walter: “I would sit in the sofa with the foot stool out. I would sit back and relax with a drink to watch TV and fall asleep. It is relaxing I have the remote control and sometimes a blanket. I don’t have to move.”

The second type of perceptual comfort set out by Heijs and Stringer referred to the environmental conditions or dimensions needed for the desired comfort activity (i.e. size of room, light, or paint colour of the walls). Some participants did choose to remark on this type of perceptual comfort [Eva, Pauline, Kevin, Rachael, and Jessica], for instance Eva noted how controlling the light helped her to get comfortable in her lounge:
Jessica noted the importance of the lighting in her bedroom in creating a comfortable experience, in particular noting a preference for low level lighting:

Jessica: “I will lie down with the duvet... I love to be warm and I find that easiest in bed... in my room I’ve got two big light sources that are on one switch and when the builders did it I thought I was going to have two light switches but I don’t so I find the lights quite bright, and I tend to put that one on above my bed.”

The last type of perceptual comfort which was identified, was in the reference to the various expressive aspects associated with the experience of perceptual comfort i.e. cosiness or spaciousness. This type of language was widely used throughout participants’ responses to getting comfortable [Maria, Eva, Pauline, Kevin, Rachael, Lewis, and Jessica]. Pauline described how the ‘airy feel’ and spaciousness of her conservatory provided a relaxing environment:

Eva: “This is the lounge area of my lounge diner. I would open the blinds slightly, sit in the arm chair and study/read. The blinds... I am able to control the light coming into that area of the room.”
Olivia described how her sofa was an area where she could relax:

\textit{Olivia: “It's where I like to sit to relax in comfy clothes and watch a film. I rearrange the cushions so I can snuggle, sometimes I put a cushion on my lap in front of me. I can sit or lie comfortably to watch films or TV shows I can enjoy, to switch off and unwind from work. It feels like my body relaxes more on there.”}

The three types of perceptual comfort were not observed independently from each other, their experiences of comfort were enriched by all of the above qualities. For instance Pauline’s conservatory (see Figure 47) where she identified qualities which made it comfortable, also had references towards the dimensions (space and lighting) of the room and the afforded behaviour (sitting).

Throughout the captured instances of perceptual comfort, participants have made repeated references to the importance of elements of physical comfort such as seating comfort and thermal comfort to their overall comfort experience. In experiencing comfort, participants discussed their desire for warmth which was often linked to feelings of cosiness, snuggling or relaxation [Maria, Pauline, Walter, Rachael, Jessica, and Olivia, 10 photographs]. There were no direct references to turning on central heating systems; participants discussed adaptive behaviours of keeping warm such as using blankets and bathing [Walter, Rachael, and Jessica, 5 photographs]. For instance, using the above example of Jessica’s bed (Figure 46)
she stated “I love to be warm” and further to this, when getting comfortable on her sofa in the conservatory, she stated the following:

Jessica: “I often lie down to watch TV and snuggle up with a blanket... I’ll wrap up in if it does get cold.”

Figure 49: Jessica, Conservatory, Perceptual Comfort

References were also made to seasonal or climatic differences in behaviour, participants described how they would use spaces differently during the winter and summer seasons [Pauline, Mike, Jessica and Olivia, 5 photographs]. Olivia drew upon the seasonal differences, commenting how her lounge area (Figure 48) is enjoyable for different reasons during the summer and winter seasons. She states:

Olivia: “In summer it's nice and relaxing as it overlooks the garden opposite patio doors. In winter it's warm and snuggly.”

Similarly Pauline (Figure 47) also described how her conservatory provided a different environment during the varying seasons; she also discussed at interview stage the use of heating in the conservatory:

Pauline: “In the summertime this can be a very cooling space - after the harsh sun has passed over the house - we can relax and enjoy the light airy room. In the winter time it is still a comforting place to sit & relax.... [in reference to using oil filled radiators when the conservatory gets cold] I wouldn't have it too cold because otherwise you lose it then as a useful room.”

Sitting comfort was noted by several participants [Pauline, Walter, Kevin, Rachael, Lewis, Jessica and Olivia, 11 photographs] and numerous references have already been discussed previously in this section (for example see Figure 44, Figure 45 and
Figure 43). When asked how this aspect signified comfort, the seating was often associated with word ‘comfy’ [Kevin, Rachael, and Jessica, 5 photographs], emphasising its importance within the comfort experience to the participant.

**8.12.6.1 Subfields of Perceptual Comfort**

As previously noted in this section, participants were able to enjoy carrying out other activities whilst getting comfortable, for a majority of this was either watching TV or reading whilst lying down or sitting in a comfortable position. It appears that being able to carry out these specific activities were an integral part of experiencing comfort. There were strong indications that there was the tendency to combine perceptive and facilitative elements (see Figure 43: Rachael, Bedroom, Perceptual and Figure 44: Walter, Living Room, Perceptual).

Elements of interactive comfort were present in a few examples; however this was not a strong link. Some participants discussed the desire to have privacy when getting comfortable, Lewis stated he would alternate between getting comfortable in his living room and his bedroom depending on whether he wanted to be alone. There was no indication of personalisation comfort being a sub-field of perceptual comfort.

**8.12.7 Beyond the Psychological Dimensions of Comfort**

The interview stage was also the opportunity to gain further perspective of participants’ experiences of comfort.

**8.12.7.1 Restriction and Hindrances on Comfort in Home**

Participants discussed a number of things which acted as a hindrance on their experience of comfort in the home. A number of participants described obstacles, for instance having jobs to do around the home would delay them getting comfortable [Olivia, Mike, and Rachael]. Mike described the following hindrance:
Other obstacles to comfort identified included having work to do at home or the responsibility of having dependent children and putting their needs first.

Issues with retaining warmth also impacted negatively on experiencing comfort [Maria, Jessica, and Olivia]; all potential hindrances were associated with feeling cold, one person described her adaptive thermal behaviour for going to bed and emphasised the importance of warmth to her feeling of comfort:

Jessica: “For me warmth, I get cold really easy, especially at night, ... if I'm on my own I tend to wear a lot of clothes, I've got all sorts of bed socks, up to here warm fluffy socks, and trousers and I have a long sleeve thermal that I wear in winter, and I quite often wear a hat in bed. I get really cold... so I think comfort for me is the heat”

Maria also commented on heating and particularly her inefficient heating system and insulation. She had previously stated in the interview the difficulty she had keeping her flat warm with using storage heaters:

Maria: “Yeah the temperature. One hundred per cent, with single glazing and crappy heaters... it’s always cold in there.”

Interestingly, Lewis noted how his state of mind could affect his comfort, he described how having a ‘bad day’ could lead to being in a bad mood at home, he said:

Lewis: “... obviously if you have a bad day, then you’re in a bad mood, and then that’s going to affect how you’re going to feel when you get home.”
Others noted how their comfort was not consciously hindered by anything. Eva noted that, due to her organisation and time management, she could schedule comfort into her routine, whilst Pauline felt, because she had the type of job role (administrative) where she could not take work home with her, stating:

Pauline: “I can just let it go and then I come home and that’s it”

8.12.7.2 Constraints on Comfort

Participants were asked whether they felt their current home constrained their comfort. One of the points they drew upon was the limitation of the current size of their property, and stating how an extra room to the home or bigger property would allow a greater sense of comfort to be achieved [Maria, Eva, Sarah and Kevin]. The purpose of the extra space varied, from carrying out necessary activities, room for study, space for guests to stay over or changing the layout to open plan. Maria expressed the need for a space to dry her clothes efficiently due to the daytime charges of her electricity tariff, economy 7, and the poor insulation of her home:

Maria: “So you have to hang up clothes, and leave a window cracked, so you don’t end up with problem with mould and condensation so that doesn’t help keep the heat in… I wish I lived in a bigger property to accommodate these things more.”

Financial constraints were felt by participants whom discussed it in conjunction to making changes or moving home, it was also important for redecorating to their taste [Eva, Pauline, Sarah, and Rachael]. Olivia described how, with more money, she would be able to purchase the furnishings she desired and replace the second-hand furniture she was currently using, whilst Rachael emphasised the need for time to carry out the work:

Olivia: “Money... because as much as I like, well I’ve done what I can with it but I haven’t got a hell of a lot of money and all the furniture was free.”
Having the time and a lack of motivation were quite significant factors, with many participants explaining that if their desire became strong enough, then they would make the changes which impacted negatively or constrained their comfort. Also worth noting, a majority of older participants (aged 40+) did not raise the issue of affordability rather an assessment of its necessity; for instance, Kevin stated:

Kevin: “I think I’ve got to a point where we’re sort of apart for a bit more space for bikes and things we don’t really need anything badly enough to want the expense or the hassle.”

8.12.7.3 Happiness in the home

Despite the above constraints and hindrances identified, 11 participants stated they were happy in their home [Maria, Pauline, Sarah, Walter, Kevin, Mike, Rachael, Lewis, Jessica, and Olivia]. Participants acknowledged that their home was suitable for their needs now but they desired to move in the future [Eva, Sarah, Lewis and Olivia], Eva expressed a paradoxical sense as she desired to relocate but she also loved her home:

Eva: “If I could pick up this house and put it in St Albans, I’d be happy... Yeah that is my dream, ever since I came to Luton... It’s funny because we were saying because we’ve done so much to this home, you know every crevice and corner, so pick it up and take it.”
8.13 Discussion

The findings of this study identified the four psychological dimensions of comfort described by Heijs and Stringer (1987). Householders were able to capture the dimensions from the guidance provided. The findings presented each dimension separately including the subfields of the other dimensions emphasising their intertwined nature. This was as to be expected, as Heijs and Stringer suggested the dimensions were interrelated and experienced collectively. This section will discuss each of the four dimensions and their corresponding sub-fields, followed by taking a closer look at the role of thermal comfort in the experience of these four factors. The final section will consider the constraints and hindrance on householders’ experiences of comfort.

8.13.1 Interactive Comfort

A majority of responses to privacy captured bathrooms and bedrooms, clearly due to the private nature afforded by such rooms. Privacy was associated with solo tasks such as hobbies or doing work. However, participants also drew upon the desire for privacy from other householders and the outside world, signifying a desire to feel cut off. This desire for privacy was recurrently associated with bathing which also offered a time for relaxation. These findings mirrored the responses from participants during study 2 in which all 6 members of the group discussed the need to have time away from other household members. Altman (1975) suggests privacy is sought once a certain level of social interaction has been reached describing two modes of privacy achievable that is what is possible in the current situation and desirable referring to the amount an individual may wish to have. A sense of achievable privacy was indicated by some participants, the notion of having some time to oneself amongst responsibilities of childcare and work appeared to be achieved.

Areas for socialising were typically communal areas of the home often included eating or some form of shared activity. Householders identified various ways in which they socialised with householders’ and guests within their home and drew upon the adaptive nature of furniture and space to accommodate their variety of
needs. A number of social interactive activities involved some form of consumer electronics this was mainly watching TV but also included using gesture controlled gaming (i.e. Nintendo Wii). For such gaming it was frequently necessary to be able to adapt the space to create enough room to play the games, which was a quality householders’ frequently associated with socialising. The layout and the ease of movement around the home were considered to contribute to the ease of social interaction. Rooms for social interactions being in close proximity to each other appear to allow for varying social interactions, something which householders referred to in regards to entertaining guests. Similar findings were found in a study exploring pleasant atmospheres of the home, in which being able to communicate with other householders’ which was considered a pleasant attribute of the atmosphere, was affected by the size and the arrangement of the rooms, even closing doors was considered to be detrimental to a pleasant atmosphere of the home (Pennartz 1986).

Overall, participants’ appeared to achieve a freedom of action, as a majority were able to provide examples of spaces which offered both privacy and the possibility for social interaction. Freedom of action is significant aspect of the home environment, it is considered to be one of the only places where the occupant has control of their actions and their environment (Altman 1975; Smith 1994).

There were a number of sub-fields which were identified within interactive comfort, and have been discussed throughout the discussion so far. Interactive comfort was mainly associated with facilitative and perceptual notions of comfort, the facilitative nature of space and furnishings helped to accommodate the many ways in which householders’ wish to socialise. Aspects of perceptual comfort were noted as participants described why they used certain spaces, describing spatial dimensions of rooms, when reference were made small rooms appeared to be acceptable for private spaces, whilst social areas were chosen for their spaciousness.
8.13.2 Personalisation Comfort

The degree of personalisation of homes varied across responses, for some, personalisation was simply displaying personal photographs whilst others considered personalising the decor and furnishings to their personal taste to be significant. The findings also revealed personalisation was not considered to be important for certain individuals who were content with anything as long as it wasn’t ‘distasteful’. However this view does not necessarily mean there is no association with comfort, as it rings true to certain definition of the word; comfort can be defined as the absence of discomfort, therefore it could be suggested that personalisation does hold some significance to these particular householders (Brager & De Dear 2003; Kolcaba & Kolcaba 1991). Personalisation appeared to be conducted in two main ways, large-scale personalisation which included changes to décor and furnishings, and small-scale personalisation, such as the display of keepsake and cherished belongings. Sometimes large-scale personalisation was desired but not possible as a result small-scale personalisation took place.

The main drivers of small-scale personalisation appeared to be memories, inherited gifts and uniqueness; the main type of keepsakes identified were the display of photographs as a way of keeping memories alive. This echoed Csikszentmihalyi and Rochberg-Halton’s (1981) exploration of the meaning of cherished objects which also found similar categories of keepsakes, although they termed them: memories, kin (inherited), associations (gifts) and intrinsic qualities (uniqueness). They too found photographs were the most significant cherished object and keeping memories alive was the main driver for displaying keepsakes.

Concerning large-scale personalisation, some householders brought attention to the challenges of shared living and the difficulty in personalisation when there are others to consider, many decisions were made jointly where couples occupied the property, and male participants in particular noted a lack of significance of personalisation leaving decisions to their partners. The process of conducting large-scale decorating projects themselves appeared to alter their relationship with the property, providing a bonding experience between householder and property. This also mirrored findings of study 1 where bonding with the property through
décor was also discussed. The main reasons given for a lack of large-scale personalisation were due to limited time and money, and for some, there was simply was a lack of inclination to make changes, suggesting small-scale personalisation can be sufficient enough to fulfil householders needs for this type of comfort.

Personalisation was mainly considered in terms of the aesthetics of the surroundings, however householders’ also referred to creating a space of their own within shared homes (i.e. householders referred to having her own hobby room). This also touched upon an element of privacy and territorial marking as in most cases participant noted this was an area which only they used.

There were strong perceptual elements to personalisation comfort, as the personalisation of a home heavily influences the perception of the surrounding environment. Emotions were clearly influential in the choice of décor for some participants; for instance relaxation and motivation were given as reasons for choices in decor. Elements of facilitative comfort have already been discussed in respects to householders’ ability to redecorate their home, as well as elements of privacy in creation of their own space.

Personalisation comfort, overall received mixed responses from participants, whilst for some this was clearly a significant quality of their home; others although they could find examples of personalisation conferred a lack of relevance in their responses. However, several aspects of personalisation comfort identified by Heijs and Stringer (1987) were visible throughout this study, in their bonding with the property, their ability to stamp their mark on the property, and displaying keepsakes.

8.13.3 Facilitative Comfort

The nature of facilitative comfort can be described as ease of which the home allows the householder to conduct various activities. This was considered to include the ability to adapt rooms or spaces as required, features (i.e. spaces or equipment)
of the home which make it possible for householders to conduct enjoyable activities and the ability to carry out necessary tasks (i.e. housework).

Householders’ ability to adapt rooms with the use of adaptable furnishings and by rearranging the layout allowed for many rooms to hold a multifunctional purpose. Rooms used in this way were communal rooms such as living rooms, conservatories and dining rooms, and adaption was typically linked to occasional use for desired activities such as social interactions with householders’ and guests. This supports the findings of study 1 where householders also remarked on the need for enough space to conduct the activities they wish to do, this is also mirrored by Oseland and Raw’s (1991) research into adequacy of space they found a majority of householders’ who felt their homes offered an inadequate amount of space, also expressed inconvenience of having guests around, and thus influencing the activities they conducted in their homes.

The adaptable nature of homes clearly allowed householders to have enough space for the activities they were conducting, it also means many rooms although still holding a prominent function such as a dining room, could also be used for a secondary functions such as spare bedroom (for example see Figure 36: Pauline, Dining Room, Facilitative). The adaptable nature of home could be an outcome of the dwelling and room sizes in the UK. Statistics have shown dwellings sizes in the UK are the fifth smallest in Europe, and have the third smallest room sizes. With this in mind, adaptability of spaces and multifunctional rooms may be a suitable response to dealing with size and space inadequacy (Williams 2009).

Householders identified both enjoyable activities and necessary tasks around their home, demonstrating a range of activities which they were capable to conduct. Enjoyable tasks were strongly associated with having enough space to conduct them and were also tied to rooms with the necessary equipment to conduct them (i.e. television located in the living room therefore the living room is the enjoyable space). Necessary tasks were associated with two main activities: personal needs (i.e. using the bathroom) and the needs of the home environment (i.e. housework). The relationship between enjoyable and necessary activities in the home were not necessarily polarised, many drew on the enjoyable nature of gardening (necessary
tasks) or the combination of housework with enjoyable tasks such as watching television. This mirrored the findings from participants in study 2’s focus group who discussed combining housework with activities they enjoyed such as listening to music whilst washing up.

Overall facilitative comfort was communicated through the ability to adapt the environment, identifying how householders’ were able to carry out a variety of activities in their homes, the home was shown to be capable of a wide variety of necessary and desirable activities for the householders, illustrating the freedom of action available.

8.13.4 Perceptual Comfort

The essence of perceptual comfort was summed up in the notion of feeling comfort. Householders’ captured perceptual comfort and encapsulated a scope of dimensions and also included associations with both facilitative and interactive comfort. A majority of activities described in reference to perceptual comfort were from a sitting position such as watching television or reading. The types of furnishings which afford sitting comfort were soft seating such as sofas and beds. This builds on the findings of study 1 in which participants’ also noted the significance of sitting comfort in creating comfort, however unlike with study 1, it was possible to see the type of seating associated with getting comfortable.

Householders described how certain areas signified comfort to them, in doing so used emotive and descriptive language which conveyed the qualities which they deemed necessary for the experience of comfort; this included the use of words such as cosy, relaxing, and snuggly. These words are challenging to interpret due to their subjective nature; however they are typically hold positive connotations and have been frequently used across all four factors to convey the feeling of comfort. Comfort clearly encapsulates a multidimensional experience; this is clear from the responses in perceptual comfort. By identifying the dimensions it goes somewhere towards unravelling the intricacies of the overall experience.
References were made to aspects of thermal comfort during householders comfort experiences across perceptual, facilitative and interactive comfort. Householders’ made reference to warmth by potentially adaptive behaviours and seasonal difference. Changing clothes is regarded as one of the key behaviour actions people take to adapt to unfavourable thermal condition (Nicol et al. 2012). In this study householders’ made references to using blankets and putting on extra clothing, however it is also worth noting householders did not state this action was as a reaction to being cold, and was only once referenced in terms of reducing energy consumption. It was mainly referenced as part of an experience of being comfortable and was frequently associated with desirable qualities of comfort such as feelings of cosiness and feeling relaxed. Therefore, it can bring into question whether in these circumstances the motivation for such behavioural change is for warmth or a sensation of comfort.

Householders’ identified bathing habits during their experiences of interactive (privacy) and perceptual comfort. Within interactive comfort householders’ described bathing as a way to have privacy from other householders and the outside world and also a time to relax; within perceptual comfort it was considered to be a relaxing and comfortable experience. Relaxation was the prominent driver of bathing rather than cleanliness; which reflects the sociological perspectives on bathing. Shove suggests bathing habits have changed to become more frequent and also holds other connotations other than cleanliness, such as pleasure and comfort (Shove 2003b).

Householders’ noted seasonal difference in their use of their home. This was particularly in reference to using the garden more during the summer for socialising (interactive comfort) and desirable activities (facilitative comfort). Householder who had conservatories all noted seasonal differences in use, using it more in the summer than the winter, although all had heating systems available.
Summary Psychological Dimensions

The four dimensions of comfort were clearly present and distinguishable from each other within the home. However, it was also evident that the relationship between the dimensions is intertwined as subfields presented for each dimension. Despite this, the experiences captured could still be categorised in one dimension more than its counterpart allowing distinctions to be made. This corresponds with Heijs and Stringer’s representation of the four dimensions, in which they describe strong links between the dimensions.

Elements of the four dimensions also corresponded with aspects of the data gathered in study 1 in which householders’ drew upon the significance of personalising their home (personalisation comfort), enough space to conduct tasks (facilitative comfort) and socialising with householder and guests (interactive comfort). However some attributes which were considered psychological in nature in study 1 were not identifiable within the psychological dimensions or with this method, such as the feeling of security. Other aspects of psychological wellbeing from study 1, such as familiarity, and state of mind were captured through the householders’ expression of why they chose certain areas for comfort, for instance taking a bath to have privacy and unwind.

The findings also captured the relationship between psychological and physical elements of comfort, sitting comfort, warmth and seasonal behavioural changes being the most prominent featured. Similarly to study 1, these features were frequently one of several components of householders’ experience of comfort.

Many of the experiences discussed during the focus group in study 2 were also identified as comfort within this study, such as being able to sit down and watch television, warmth and bathing, corresponded with the opinions expressed during the focus group, strengthening the data identified through the group discussion (this is particularly significant for the comfort summaries which will be used in study 4, see Chapter 9).
8.13.7 Restrictions, Hindrances and Constraints on Comfort

The hindrances and constraints identified by householder fell into two categories: daily issues and long-term issues. Householders identified daily issues such as having to do necessary tasks (i.e. chores) prior to getting comfortable, which suggests comfort making can be a moveable part of householders’ daily routines; one individual went as far to say they scheduled time to unwind within their busy schedule. This also echoes the findings of the focus groups in which householders’ noted similar opinions, suggesting comfort was achieved once other tasks had been completed.

The challenge of keeping warm on a daily basis was expressed as an issue by some householders; as a result they conducted adaptive thermal behaviours, typically putting on extra clothing appeared to be the way in which householders overcame this issue. In terms of long-term restrictions, some householders expressed the desire for an extra communal room, interestingly all householders’ who shared this view had either joint lounge-dining rooms or kitchen-dining rooms; suggesting the combination of two rooms results in reduce satisfaction with the adequacy of space. Despite the restrictions and constraints almost all householders still felt happy in their home, suggesting the issues they were facing were not significant enough to impact on their enjoyment of the home environment.

8.13.8 Reflections

The photo elicitation interview method was chosen to allowed the participants to capture their interpretation of the four dimensions and through the interview create a shared interpretation of the meaning behind each image. Participants were asked to give descriptions of the images and explain why they took the photo and how it fitted the brief but frequently there was enough detail prior to interview to interpret their understanding of the four dimensions of comfort. The interview gave the opportunity to discuss the full scope of the four factors, interviewing alongside the images they had captured appeared to help participants recall what they had captured and also gather further insights.
Participants’ feedback on the photo elicitation method was mostly positive although some felt they couldn't find enough different places to capture for the number of headings and as a result used some photos for more than one dimension. In the briefing phase the researcher did emphasise to participants to take as many photos as they felt necessary, in total participants could have taken 15 photos and on average they took 11 photos across the categories. On the other hand fewer participants felt that they could have taken more than three images of personalisation comfort, which suggests giving a specific number limited some but also encouraged others.

The forestructure of understanding was shared with participants in the use of Heijs and Stringer’s four factors as guidance for capturing psychological dimensions of comfort. At a glance, this may appear to be uncharacteristic of the typical phenomenological approach which focuses on exploring the phenomenon in question without boundaries in order to understand the lived experience from the perspective of the participant; however when conducting inquiries into ready-to-hand experiences it is said people are engaged ‘in an absorbed manner so that the equipment is for the most part unnoticed’ (Plager 1994, p.73). The overlooked nature of comfort was visible within study 1 where physical aspects of comfort such as thermal comfort were commonly mentioned initially followed by psychological aspects after prompting; comfort was even expressed as a sub-conscious experience by some participants. Sharing the forestructure with participants also benefitted participants by drawing their attention to aspects of the phenomenon which they typically take-for-granted. This study was designed to capture the psychological dimensions of comfort, in depth; using an interpretive phenomenological approach allowed the use of the four factors of comfort by Heijs and Stringer as a template which focused data collection on such aspects and away from capturing further details of dimensions which have already been established, and towards the lesser known aspects of comfort from the perspective of the householder.

This study was conducted simultaneous with study 4; the interview stage for the photo elicitation method ran consecutively, the total interview took 50 minutes.
(they were estimated to take 1 hour). Running the two stages consecutively, was of benefit to the interview process, it ensured the interview remained focused on the topics and moved swiftly.

8.14 Conclusions

Householders were able to identify the psychological dimensions of comfort within their home, drawing on their own experiences, and as a result an understanding of these dimensions and the role they play in creating comfort could be achieved. In their identification of the four dimensions householders also identified the variety of qualities of the home environment, activities and actions which take place to create comfortable experiences in the home environment. The exploration of these factors also exposed the relationship between psychological dimensions and more traditional physical and physiological aspects of comfort such as sitting and thermal comfort. Therefore this study also provided further evidence of the multidimensional nature of comfort.

Heijs and Stringer developed the taxonomy of comfort in 1987 because they found there was a tendency for research into residential comfort to focus on the physiological features. By conducting a content analysis of the available literature they formed the four dimensional structure in order to provide a classification system to clarify how the psychological dimensions of comfort are experienced in the home environment. This study has successfully presented extensive evidence of the relevance of the four dimensions in UK homes.
Chapter 1: Introduction
Chapter 2: Literature Review
Chapter 3: Research Paradigm
Chapter 4: Methodology
Chapter 5: Exploring Householders’ Perspective of Comfort in the Home
Chapter 6: Household Profiles
Chapter 7: Insights into Comfort and Daily Routines
Chapter 8: Exploring Psychological Dimensions of Comfort in the Home
Chapter 9: Capturing Comfort in Context
Chapter 10: Discussion: A Classification of Domestic Comfort
Chapter 11: Conclusions and Future Work
Chapter 12: References
Chapter 13: Appendices
9 Capturing Comfort in Context

9.1 Introduction

So far this research has focused on exploring the meaning and creation of comfort in the home. The research has examined the scope of dimensions associated with the meaning and creation of comfort in the home and as a result identified the multiple dimensions which are associated with comfort, several of which suggested certain areas of comfort needed to be explored further. Subsequently, this research recognised a need to conduct an in-depth exploration of the psychological dimensions of comfort, and as a result identified the relevance of these dimensions to experiencing comfort.

The breadth and depth of comfort dimensions have been explored over the course of this research, however this research has of yet captured householders’ in situ creating comfort. This chapter will present study 4 which sets out to explore comfort in context using ethnographic tools. Firstly, an overview will be given of approaches to conducting studies in the home context.

9.2 Comfort in Context

As it has been established in the literature review and previous studies, the home environment holds a unique set of qualities unlike a majority of other environments we encounter. The home environment typically offers the occupant control and freedom of action; partly as a result, there are multiple components to home life which vary in significance within different households (Altman 1975; Smith 1994). From a researcher’s perspective this can make studying the home environment challenging. For many researchers, this challenge has led to the application of ethnographic tools to better explore the components of home life in context. In recent years the use of ethnography in the home has become more prominent, especially within the realm of HCI where ethnographic methods have frequently been applied to study the use of domestic technologies (Blythe & Monk 2002; Crabtree et al. 2002; Obrist et al. 2008; Haddon 2006; Haines et al. 2007). Obrist
and colleagues (2008) used ethnographic methods during field trials of a new interactive television for the home. The self-reporting methods they used included diaries which were used in conjunction with cultural probes. The study was designed to improve the interactive TV services; in doing so they explored householders’ daily routines through their completion of the diaries and by capturing images around their home as part of the probe. Their found the methods were appropriate for exploring the users’ experience of TV watching in the home environment. They also encouraged further research in designing technologies for the home to follow suit and apply ethnographic methods. A key reason for this was due to the intimate nature of home life, from the activities to the social relationships, the context is unique and personal to the householder, and differs from studying other environments (i.e. work environments).

Research taking a practice-orientated approach within the home context has also used ethnographic methods for examining practices, such as laundry, bathing, and cooking. This has also encouraged the use of self-reported methods to explore the private activities of householders’. Kuijer and Jong (2009) explored bathing practices in the home in order to encourage more sustainable practices, they not only used self-reporting methods to establish their current bathing practices, but participants also designed their own ‘experiment’ in the sense that they created their own sustainable practices. They found this approach was valuable for engaging the participants’ and also encouraging the uptake of the new practices as they were designed by the participants’ themselves. Although they also drew upon the reliability of the data as it was self-reported, they suggest certain elements may have benefited from a more hands-on approach.

From previous research, self-reporting methods appear to be less obtrusive and more engaging than traditional field ethnographic methods. They have proven strengths for capturing the private and intimate nature of comfort (Hodges et al. 2006; Nguyen et al. 2009; Kuijer & Jong 2009; Obrist et al. 2008). The use of self-reporting method over more traditional ethnographic methods in research has also be driven by time restrictions and a lack of resources. However in the case of this study, self-reporting methods are applied to capture the experience of comfort
which has already shown itself to be private and personal, especially in study 3. Therefore this study will use self-reporting methods to capture comfort in context.

9.3 Study Aims

This study was conducted to address the following objectives:

- Determine when comfort takes place at home in the everyday lives of householders.
- Examine different self-reporting data collection tools for exploring comfort making activities in the context of the home environment.

9.4 Rationale

The purpose of this study was twofold: to explore where and what type of comfort activities take place during householders’ home life and to investigate the use of self-reporting observational tools for capturing householders’ routines and their experiences of comfort in the home. The two self-reporting tools were examined: a wearable camera known as a SenseCam and the self-completion diary tools; both tools are explored in terms of their ability to capture the householders’ environment, their engagement in activities, their interactions with objects and actors within their everyday routines. As previously stated, capturing comfort in the home has its difficulties due to the intimate nature of the topic, therefore the two self-reporting tools are hoped to capture comfort activities without impacting on occupants’ behaviour. Participants’ comfort experiences are identified using summaries of their personal comfort activities and preferences which are based on cumulative data from the focus groups attended by each participant and photo album study, reported in the previous two chapters. As a result the following research questions were set out to be answered by this study:

4) Can comfort making activities be identified from householders’ after work routines?

5) Can self-reporting methods be used to capture householders routines and specifically comfort making activities?
9.5 Methods

It was determined that ethnographic tools would be appropriate to capture the experience of creating comfort within everyday life. The use of visual methods was viewed as a powerful tool for capturing this process, and potential tools were considered.

A small camera called the Mini DV was tested for its suitability as an observation tool; it captured video including audio and could be used in a static position with a stand or wearable by clipping onto clothing. A fellow researcher was asked to use the camera at home after work and to provide feedback on their experience. It was found that the clip was not fit for purpose as the sheer weight of the camera resulted in the camera facing downwards and the video which was captured was unstable and unclear. When testing the camera in a static position the researcher placed it in their living room near their television in order to capture their own behaviour. The researcher stated they felt they were being watched when the camera was in a static position, they also noted the audio was mainly from the TV. They preferred to wear the camera but also noted they were conscious that their conversations with other householders were being recorded. There were technical issues faced when attempting to view the data from the camera which raised concerns in regards to reliability of the software. As a result of the testing process the Mini DV was not used to as an observational tool, however it did emphasise how positioning the camera facing towards the participant could potentially cause them to feel watched and uncomfortable which may affect the outcome of the study. Also the audio appeared to make the researcher cautious of what they said, again this is likely to impact on their ability to get comfortable.

Following this, the SenseCam was trialled and chosen as a suitable observational tool for this study. The SenseCam tool is a wearable, 3 megapixel wide angled camera which takes a photo every 20 seconds. It captures images from a point-of-view angle allowing the researcher to see what the participant sees and therefore what objects and people they may interact with in their home. The wearable aspect of the SenseCam (as opposed to a static camera) means all householders activities around the house can be captured rather than just one room. With the Vicon Revue
Desktop software which accompanies the SenseCam, each of the time-stamped images can be easily viewed along the timeline thus allowing comfort activities to be identified within the context of the other daily activities. Research has shown the SenseCam tool followed by a recollection interview is best practice in identifying activities and providing further detail than the images alone could possible offer, therefore this was the procedure followed in this study (Hodges et al. 2006; Sellen et al. 2007). The Vicon Revue Desktop software offers a viewing platform for the images to be displayed during the recollection process, with multiple playback speeds. This would make it convenient to go through the large number of images produced by the SenseCam.

Using diaries can capture participant’s interpretation of the socio-cultural meaning behind their activities (Brewer 2000). Self-reporting diary techniques consists of the participant keeping chronological records of their own activities. As discussed in the Chapter 4 using, self-reporting methods can present inconsistency within the results, the technique depends heavily on what the participant considers worthy of reporting which is why it is not typically used as a sole method; it is typically combined with other techniques to collect data which supports the diary such as interviews. The diary-interview method was initially developed by Zimmerman and Weider (1977) to gain a detailed insights into the lives of respondents, the diary techniques provided them with the data to develop probing questions and a further detail of activities through the interview process. In addition, by using this technique, Zimmerman and Wieder (1977) found that participants were more engaged in the topic. The combined diary and interview method outlined here was seen as a suitable technique for gathering data on the everyday activities in the home. The opportunity to follow-up with additional questions allowed for further information to be gathered and avoid the usual inconsistency, typical of self-reporting diary methods.

The SenseCam and diary are the two self-reporting observational methods chosen to capture comfort making activities in the everyday home life of participants. It is expected that the activity patterns of householders are likely to vary daily
especially between working days and days off. With this in mind, after work routines were the focus time period for data collection.

9.6 Sampling

A purposive sampling strategy was used to select participants, who completed studies 2 and 3. The sampling strategy is described in Chapter 4: Methodology.

The aim of this study is to identify comfort activities within householders’ after work routines, therefore the specific criteria for this stage required candidates to work away from home for at least 20 hours a week in order to be suitable participants.

9.7 Piloting

As previously stated a pilot was conducted for all stages of the data collection process (the focus group, photo album section and tools for capturing comfort). The SenseCam was piloted with one participant whilst the self-completion diary was piloted with two participants. After the pilot study further information was added to the SenseCam instructions to guide participants through technical issues. No major changes were made to the procedure.

9.8 Design of Study

The design of this study can be divided into two parts, the observational stage and the interview. The record book was designed to provide guidance and space to enter data for the diary study. The diary pages were designed to be completed by participants, they were asked to provide the start and end time, alongside a description of their activities. This was intentionally kept simple and unfussy as to avoid overcomplicating the main task of logging their activities. For the SenseCam process, the record book provided guidelines for wearing and turning on the camera, it also provided technical support in case of errors occurred, for instance how to reset the camera. See appendix F for the full record book.
The diary-interview process gave the opportunity to gain clarification if required on the data logged by participants, and to also elaborate further on any points of interest, therefore questions were customarily designed for each interview. There were also set questions on the topic of routines for every participant, there were open questions designed to explore their general daily and seasonal activities and to understand what it is important to their everyday home life. These questions can be found in appendix F.

The recollection interview for the SenseCam process was designed to gain further detail about the participants’ after work routines. Participants were asked to narrate their action and activities alongside the images. Probing questions were asked when participants failed to describe a change in activity or further details were required. The interview stage took place at the home of each participant.

9.9 Ethical Considerations

The ethics of using SenseCams was given great consideration; the position of the camera meant individuals who had not consented to taking part in the study could potentially be captured. However as the camera was to be used within the participant’s home, all other householder members could be informed of the camera, therefore participants were asked to make all other household members aware of their participation in the study and assured no images of them would be used. The ethics checklist is set out in Chapter 4 (see section 4.8), it was completed and appropriate procedures were followed, but it was not necessary to seek full ethical approval from Loughborough University as existing protocols covered the activities in full.

9.10 Equipment

All participants were provided with a record book to complete for the photo album stage (study 3, reported in chapter 7) and the diary pages for this study, together with a guide to using the SenseCams, including instructions for rebooting if errors occurred with the cameras (see appendix F– for an example of the record book).
Data collection took place in two phases: one group in Luton and one in Loughborough. There were 2 SenseCams available for use, and participants were offered the choice of using the SenseCam if they wished. For the first set of six, only two chose to use the camera, however in the second set of six participants, all six participants chose to use the camera, therefore a schedule was derived to drop and collect the cameras from each participant. All data was transferred from the cameras after each use and the cameras were charged fully.

9.11 Procedure

The diary procedure consisted of four stages: briefing, logging, reviewing and probing. Participants' attended a briefing as part of the focus group described in chapter 7, during which they were shown the diary pages in the record book and the instructions on using the SenseCam. Participants logged their activities for up to three days in the record book. The diaries were then reviewed in order to pinpoint any items which required clarification. The interview was conducted as the probing phase, which gave the opportunity to address any points identified in the review phase.

The SenseCam procedure was divided into three stages: capture, review and recollection. The capture stage refers to the main data collection procedure where participants used the SenseCam. This was followed by the review phase; the researcher transferred the data from the camera and reviewed images using the Vicon Revue Desktop software to check for errors. Participants were given the option of reviewing the images prior to the researcher to ease any concerns they may have had. Finally for recollection, interviews were conducted with the participants who were shown their full after work routines in images, and were asked to narrate their activities alongside the images. Using the Vicon Revue Desktop software, participants were able to control the speed of playback.
9.12 Data Analysis

9.12.1 Comparing Observational Tools

As observational tools, the SenseCam and diary study serve the purpose of gathering details of the major features of the place, the actors and the activities in which the participants are located. All participation observations took place in social situations and Spradley (1980) notes nine dimensions to which an observer should record:

1. Space: layout of the physical setting; rooms, outdoor, spaces, etc.
2. Actor: the names and relevant details of the people involved
3. Activity: the various activities of the actors
4. Object: physical elements: furniture etc.
5. Act: specific individual actions
6. Event: particular occasions, e.g. meetings
7. Time: the sequence of events
8. Goals: what actors are attempting to accomplish
9. Feelings: emotions in particular contexts

(cited by Robson (2002, p.320))

Spradley (1980) presented the above nine dimensions as a general guide for observers capturing the complete social situation when out in the field. The dimensions alone tell a limited story, it is the relationship between these dimensions which allow cultural meaning to be revealed. Both tools were used in order to capture comfort in the home environment within householders daily routines, therefore observing the aforementioned dimensions was crucial to understanding the relationship between them and thus establishing meaning to householders daily routines. It was considered a useful guide to provide a basis for comparing two observational tools on their abilities to capture in context.

9.12.2 Identifying Comfort Activities

The personal comfort activity summaries were used to ascertain whether certain activities were comfort seeking in nature based on the significant amount of data collected on participants’ comfort activities during the introductory focus group, photo album study and interviews (see appendix G). Each diary day and SenseCam day was then examined so that activities which were potentially comfort seeking in nature could be highlighted. For example, Sarah previously expressed getting comfortable in the following ways:

- Watching television
- Sitting on the sofa
- Using a blanket

Consequently potential comfort seeking activities could be identified within Sarah’s diary entries, as there were instances where she sat down on the sofa and watched television; these are highlighted within Figure 51.
<table>
<thead>
<tr>
<th>Participant: Sarah</th>
<th>Time From:</th>
<th>Time To:</th>
<th>Duration (minutes)</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day: 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17.30</td>
<td>17.45</td>
<td>15</td>
<td>Went straight to the kitchen when I got home, to prepare dinner</td>
<td></td>
</tr>
<tr>
<td>17.45</td>
<td>17.55</td>
<td>10</td>
<td>Washed up dishes left in sink from morning.</td>
<td></td>
</tr>
<tr>
<td>17.55</td>
<td>18.10</td>
<td>15</td>
<td>Made a cup of tea and chatted to John in the kitchen while dinner was cooking.</td>
<td></td>
</tr>
<tr>
<td>18.10</td>
<td>18.20</td>
<td>10</td>
<td>Took my boots off and went to sit in the living room in front of the TV.</td>
<td></td>
</tr>
<tr>
<td>18.20</td>
<td>18.50</td>
<td>30</td>
<td>Served dinner and went back to the living room to eat and watch TV.</td>
<td></td>
</tr>
<tr>
<td>18.50</td>
<td>19.00</td>
<td>10</td>
<td>Went back to kitchen washed dishes and left them to dry.</td>
<td></td>
</tr>
<tr>
<td>19.00</td>
<td>20.30</td>
<td>90</td>
<td>Went back to living room to sit and watch TV.</td>
<td></td>
</tr>
<tr>
<td>20.30</td>
<td>20.45</td>
<td>15</td>
<td>Called Mum for a chat.</td>
<td></td>
</tr>
<tr>
<td>20.45</td>
<td>21.00</td>
<td>15</td>
<td>Called my sister in law for a chat.</td>
<td></td>
</tr>
<tr>
<td>21.00</td>
<td>21.30</td>
<td>30</td>
<td>Watch TV in the living room</td>
<td></td>
</tr>
<tr>
<td>21.30</td>
<td></td>
<td></td>
<td>Went to bed</td>
<td></td>
</tr>
</tbody>
</table>

**Figure 51: Sarah, Diary Day 1**

9.12.3 Validity of Data

In order to validate the comfort making activities, a strategy known as member checking (which is detailed in Chapter 4: Methodology) was used with four of the participants to verify the comfort making activities which were determined through the previous studies, were moments where they were actually experiencing comfort. Member checking was conducted with participants Maria, Walter, Jessica, and Olivia. Two confirmed the comfort making activities which had been highlighted by the researcher were most likely to be moments where they were unwinding. Participant Olivia added a further moment of unwinding towards the
beginning of her evening, whilst Maria suggested short periods towards the beginning of her evening were not likely to be unwinding.

9.13 Participant Information

The average journey home time for participants was 28.75 minutes ranging from 10 minutes to 75 minutes, with a majority of householders indicating they drove home from work.

Participants’ were asked whether they worked at home after work and whether they spent time thinking about work after arriving home. A majority of participants stated they sometimes took work home to do and also sometimes thought about work at home, the range of responses are shown in the table below:

<table>
<thead>
<tr>
<th>Doing work at home</th>
<th>No. of Participants</th>
<th>Thinking about work at home</th>
<th>No. of Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>I always take work home</td>
<td>1</td>
<td>I always think about work at home</td>
<td>3</td>
</tr>
<tr>
<td>I sometimes take work home</td>
<td>6</td>
<td>I sometimes think about work</td>
<td>7</td>
</tr>
<tr>
<td>I rarely take work home</td>
<td>2</td>
<td>I rarely think about work</td>
<td>1</td>
</tr>
<tr>
<td>I never take work home for me</td>
<td>1</td>
<td>I leave work at work</td>
<td>1</td>
</tr>
<tr>
<td>N/A</td>
<td>2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The full participant information can be found in chapter 7: Insights into Comfort and Daily Routines. The table below summarises the main characteristics and corresponding codes for each participant, as a reminder:
Table 15: Participant Information

<table>
<thead>
<tr>
<th>Participant</th>
<th>Gender</th>
<th>Age</th>
<th>Number of Householders</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maria</td>
<td>Female</td>
<td>29</td>
<td>2 adults</td>
</tr>
<tr>
<td>Eva</td>
<td>Female</td>
<td>48</td>
<td>3 adults, 1 children</td>
</tr>
<tr>
<td>Pauline</td>
<td>Female</td>
<td>56</td>
<td>2 adults</td>
</tr>
<tr>
<td>Sarah</td>
<td>Female</td>
<td>50</td>
<td>2 adults</td>
</tr>
<tr>
<td>Sade</td>
<td>Female</td>
<td>27</td>
<td>3 adults</td>
</tr>
<tr>
<td>Walter</td>
<td>Male</td>
<td>58</td>
<td>2 adults</td>
</tr>
<tr>
<td>Kevin</td>
<td>Male</td>
<td>45</td>
<td>2 adults, 2 children</td>
</tr>
<tr>
<td>Mike</td>
<td>Male</td>
<td>63</td>
<td>2 adults</td>
</tr>
<tr>
<td>Rachael</td>
<td>Female</td>
<td>35</td>
<td>2 adults, 2 children</td>
</tr>
<tr>
<td>Lewis</td>
<td>Male</td>
<td>25</td>
<td>3 adults</td>
</tr>
<tr>
<td>Jessica</td>
<td>Female</td>
<td>28</td>
<td>3 adults</td>
</tr>
<tr>
<td>Olivia</td>
<td>Female</td>
<td>26</td>
<td>2 adults</td>
</tr>
</tbody>
</table>

9.14 Findings

The self-completion diary was completed by all 12 participants for 2-3 days after work (2 days for SenseCam users and 3 days for diary only participants); the SenseCams were used by 8 of the 12 participants for one day after work. The SenseCams were used on average for approximately 4 hours ranging between 3 hours to 5 hours 23 minutes. For the self-completed diaries the duration of times recorded were between 2 hours 50 minutes to 8 hours 50 minutes. Overall, SenseCam and self-completed diaries on average begun at 17.45 and ended at 23.00.
Two objectives were to be addressed within this study therefore the findings are presented in two stages, firstly, reporting the findings of comfort activities in the everyday lives of householders, secondly comparing the two observational tools in terms of capturing the space and activities of householders.

9.14.1 Comfort in Daily Routines

A review of the diary study allowed probing questions to be developed for the interview stage where further clarification of participants activities were required, alongside set questions in regards to the activities in their routines. Where the SenseCam was used, participants narrated alongside the images captured, adding further details about the situation.

Overall, participants appeared to provide records of a range of activities they had undertaken each evening, with time stamps. Daily routines frequently consisted of similar activities each day, although the sequence varied. The comfort activities included short tasks, such as changing into comfortable clothing, to longer unwinding activities, such as watching television.

A majority of participants did not make habitual changes to their environment when initially arriving home, although the heating was mentioned at this point by a few participants, stating it was pre-programmed to turn on at a certain time. Many participants recorded similar tasks at the beginning of their after work routines, which for a majority of participants involved changing their clothes [Maria, Eva, Sade, Walter, Kevin, Mike, Jessica and Olivia] soon after arriving home into something ‘more comfortable’ or ‘house clothes’.

A majority of comfort seeking activities were identified after they had completed essential tasks or chores such as preparing dinner, child care, cleaning, washing, etc. This had been initially noted during the introductory focus group, where a majority of participants [Maria, Eva, Pauline, Sarah, Sade, Rachael, Lewis and Jessica] stated they were unable to get comfortable until essential tasks had been completed and this was confirmed by the diaries and SenseCam data. Consequently, the essential tasks and chores recorded fell towards the beginning of the evening, especially the
preparation of dinner, which was done by most participants within the first half of the evening, as illustrated by Sarah’s diary entries for her first day (see Figure 51). What time did people get home? What time did people go to bed? What time approximately are people at home for in the evening?

Unwinding took place towards the end of the evening, which a majority of the participants had previously indicated during the focus group. Unwinding comfort activities were more frequent and for longer periods of time after necessary or essential tasks had been completed. This is demonstrated by the diaries of participants Maria and Walter shown below in Figure 53: Maria, Diary Day 3 and Figure 52: Walter, Diary Day 3

<table>
<thead>
<tr>
<th>Participant: Walter</th>
<th>Time From</th>
<th>Time To</th>
<th>Duration (minutes)</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maria</td>
<td>17.30</td>
<td>18.00</td>
<td>15</td>
<td>Got home change out of my work clothes check mail – phone messages</td>
</tr>
<tr>
<td></td>
<td>18.00</td>
<td>18.15</td>
<td>15</td>
<td>Have a cup of tea</td>
</tr>
<tr>
<td></td>
<td>18.15</td>
<td>18.30</td>
<td>15</td>
<td>Wash dishes</td>
</tr>
<tr>
<td></td>
<td>18.30</td>
<td>19.00</td>
<td>30</td>
<td>Sorting through some paper work car insurance etc.</td>
</tr>
<tr>
<td></td>
<td>19.00</td>
<td>19.30</td>
<td>30</td>
<td>Sit in kitchen with a cold beer talking to my wife while she is cooking</td>
</tr>
<tr>
<td></td>
<td>19.30</td>
<td>20.30</td>
<td>60</td>
<td>Eat dinner with my wife</td>
</tr>
<tr>
<td></td>
<td>20.30</td>
<td>20.45</td>
<td>15</td>
<td>Put plates away washed up</td>
</tr>
<tr>
<td></td>
<td>20.45</td>
<td>00.00</td>
<td>195</td>
<td>Sat down to watch TV and have a drink</td>
</tr>
<tr>
<td></td>
<td>00.00</td>
<td>00.30</td>
<td>30</td>
<td>Went up for a shower</td>
</tr>
<tr>
<td></td>
<td>00.30</td>
<td></td>
<td></td>
<td>Went to bed read and then sleep</td>
</tr>
</tbody>
</table>

Figure 52: Walter, Diary Day 3
<table>
<thead>
<tr>
<th>Time From:</th>
<th>Time To:</th>
<th>Duration (minutes)</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>18.00</td>
<td>18.10</td>
<td>10</td>
<td>Arrive home, read post and change my clothes.</td>
</tr>
<tr>
<td>18.10</td>
<td>18.35</td>
<td>25</td>
<td>On the phone</td>
</tr>
<tr>
<td>18.35</td>
<td>19.30</td>
<td>55</td>
<td>Wash up the dishes and cook dinner</td>
</tr>
<tr>
<td>19.30</td>
<td>19.45</td>
<td>15</td>
<td>Ate dinner</td>
</tr>
<tr>
<td>19.30</td>
<td>21.20</td>
<td>110</td>
<td>Watch TV, read holiday brochure, talking.</td>
</tr>
<tr>
<td>21.20</td>
<td>21.45</td>
<td>25</td>
<td>Shower</td>
</tr>
<tr>
<td>21.45</td>
<td>23.00</td>
<td>75</td>
<td>Watched TV.</td>
</tr>
</tbody>
</table>

Watching television was the most common comfort activity logged by participants with a majority of them [all participants with the exception of Eva] sitting down at some point during their evening to tune in; this was observed across both the diary and SenseCam data which also corresponded with the comfort activities in their comfort summaries. Watching televisions was considered a comfort activity by Maria and was evident during her use of the SenseCam as illustrated by the image and quote below; Maria finished her dinner and watched television with a glass of wine:

**Time: 19:30**

*Maria: "You see the whole of Eastenders is completed and I haven’t finished one glass. Basically this shows that I sat down and watched all of Eastenders."*
Watching television or films often featured within participants’ schedules towards the end of the evening and was generally experienced for longer periods of time (1 hour or more) than other activities, potentially for tuning into a specific programmes. Participants’ frequently logged watching television whilst conducting other activities such as eating [Maria, Pauline, Sarah, Sade, Walter, Jessica and Olivia] or tasks which they could divide their attention between. This was apparent during Olivia's SenseCam use (Figure 55), where she combined essential tasks (completing a form) with watching TV:

\[\text{Figure 55: Olivia, SenseCam, Time 22:56}\]

Olivia: “I sat on the sofa because I didn’t finish that, I had two forms I did one knee form and I went to do the other one.”

Other activities were also observed. For Mike, comfort was gained by finding privacy from other householders; consistent with what he had previously stated during the focus group session where he explained how he would avoid certain programmes by using the computer in the study. He further stated during the interview process that he completed puzzles and games to unwind, as shown in Figure 56:
For Pauline, unwinding after work meant having time to do scrapbooking which was an activity she had noted during the focus group that scrapbooking was an unwinding activity. She also noted watching television, but as you can see from Figure 57 (shaded areas indicate unwinding activities), she spent a considerable amount of time scrapbooking.
During the focus group, both Kevin and Lewis referred to learning or doing something completely different to work as part of their unwinding process and this was evident during their SenseCam usage; in fact, Kevin indicated he was keen to do something physical rather than anything requiring brain power. He also expressed frustration in regards to watching too much television, and during the interview he stated:

Kevin: “If I’m watching telly then I tend to just flop down on the sofa, but I get a bit frustrated so if I think right I’ve spent forty minutes watching crap on telly, I then want to go and do something useful so I won’t spend the whole evening watching telly.”

From Kevin’s SenseCam use, he could be seen biking for 30 minutes; a physical activities rather than anything which required brain power:

Time: 20:27

Kevin: “This is me in the alleyway, I’ve got a little strap that’s holds the wheel of the bike up and another one which holds it down to a weight and let the bike move up and down a little bit. But what I’m basically doing here is practicing wheelies.”

Figure 58: Kevin, SenseCam, Time 20:27

Lewis also felt doing something completely different helped him unwind, which was captured by the SenseCam; he could be seen practising the guitar for a total of 88 minutes spread out across other evening:
9.14.1.1 Summary of Comfort in Daily Routines

With the use of the comfort activity summaries the potential comfort making activities of householders could be identified. The main comfort making activity recorded was sitting down and watching television, which was recorded by all participants except Eva. Changing clothes appeared to be habitual for many participants’, changing out of work clothes soon after they had returned home. Other activities which were recorded as potential comfort making activities included a variety of hobbies which participants had expressed were unwinding or comfort making activities in studies 1 and 2. The potential comfort activities appeared to be experienced more frequently and for longer periods of time towards the end of the participants’ diary records and SenseCam images, it appeared to be experienced once householders had completed necessary tasks.

9.14.2 Capturing in Context

The following sections will present a comparison of the two observational tools used in this study. As outlined in the data analysis section the two observational tools will be compared on a number of dimensions of social situations. It is
important to bear in mind the nine dimensions were highlighted as a general guide for observers to help capture the complete social situation and therefore not all nine dimensions are necessarily present in every observable situation. In this study no significant events were observed and as a result have not been included in the findings below.

9.14.2.1 Overview of the Observational Tools

Data from the SenseCam’s were collected and inspected by the researcher prior to the recollection interview to check for errors in the recording. On some occasions, it was discovered the SenseCam’s had malfunctioned and failed to record any data in which case participants were asked to wear the camera again. Participants were able to adjust the straps of the SenseCam so that the camera was positioned in the middle of their chest (see section 4.4.4.1, Figure 7), however one participant expressed difficulty in doing this due to her chest size and resulted in the camera facing slightly upwards. Occasionally, clothing or blankets obscured the view of the camera, though this was usually for short periods of time and explainable by participants during the recollection phase.

The SenseCams were used over the duration of 3 hours to 5 hours 23 minutes after work, which captured on average 1,026 images per participants, ranging between 732 and 1,664 images. The 3 megapixel cameras, generally speaking, produced clear images; participants’ rooms and property layout were identifiable as were a majority of their activities through the images alone. However, some images were blurry and out of focus especially in low light or when participants were in motion. Although visual detail was lacking, the out of focus images often acted as indicators of motion and aided in participants’ recollection of their movements through the home. The narration process drew similarities to the more traditional observational technique of taking a grand tour of a participant’s home as they recalled their movements. The narrative provided appeared to be a combination of remembering what they did and knowing their routines. During the recollection interviews, Vicon Revue Desktop Software was used to display the images and to
play them sequentially, resembling video playback. Participants were able to control the speed, revisit images and narrate alongside their activities.

The completed self-reporting diaries were reviewed prior to the interview to prepare probing questions and to identify anything which required clarification. The activities were varied, as was the amount of detail given from participants; however they included ample information to capture an understanding of what took place.

9.14.2.2 Space

Identifying the spaces was truly the basis of making sense of the connections and interactions between the activities, actors, and objects. With the SenseCams the spaces, rooms and layout of the home were visually captured and easily identifiable by householders during the recollection interview. From a researcher’s perspective, the images were clear enough to be recognisable as different rooms in the house; Figure 60 shows a selection of images of different spaces in participants’ homes). The wide-angled lens also assisted in capturing as much of the surrounding physical environment as possible. In some cases, identifying tasks proved difficult once it started to get darker, the low level of lighting meant certain tasks could not be seen clearly but the activities in most cases could be identified through the habitual nature of participants’ routines.
In terms of identifying the location of participants and their activities, self-completion diaries rely on the information participants choose to disclose. Although, in a majority of cases, participants did record some references to where they were in their homes, this was logged sporadically throughout. In some cases, the rooms were not noted at all by participants but a location could usually be deduced from the activity, as well as basic reasoning (i.e. ‘washing dishes’ therefore the participant must be in the kitchen). The rooms were particularly important in recognising comfort making activities as they also played a role in comfort, for instance reading a book in the kitchen may not be considered as comfortable as reading a book in bed. Unlike the data from the SenseCam, it was not possible to gain a visualisation of the layout or spatial dimensions of rooms from the diaries.

9.14.2.3 Time

The SenseCam captured the sequence of activities with accurate time stamps every 20 seconds. The Vicon Revue Desktop software was used to view images and the software displayed the time and date each image was captured and a clear timeline to show the progression through the dataset, as shown by Figure 61. Unfortunately as a result of unforeseen errors occurring with the cameras, on some occasions the timestamps were not available and reset to the default date and time ‘01/01/2007 at 00:00 hours’. In such cases, participants were asked to provide an estimated time...
of their arrival home and, as photos were still taken every 20 seconds, the times for their activities could be approximated.

Figure 61: Vicon Revue Desktop Software Screenshot

Images were in 20 second intervals which allowed for whole sequences of actions to be conducted. For instance, through the SenseCam, participant Kevin can be seen eating dinner from 19:31 to 19:37 as illustrated by Figure 62. With the aid of the recollection interview, it could be determined Kevin begun by getting his dinner from the oven (image 1), he can be observed eating his dinner from images 2-5, and then continues to sit at the table and read as visible in image 6. Whilst for the same participant the same activity is reduced to two lines of diary entry, see Figure 62:
Generally, the SenseCam captured a variety of activities which varied in length. With longer tasks, such as reading, sitting down or comfort making activities were captured through a sequence of image; short tasks such as participants checking their mobile phones or turning up the thermostat were tasks which were fortunate to be captured. With 20 second intervals, it is unknown how many short activities could have potentially been missed.

<table>
<thead>
<tr>
<th>Participant: Kevin</th>
<th>Day 3 Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Time From:</strong></td>
<td><strong>Time To:</strong></td>
</tr>
<tr>
<td>19:40</td>
<td>Heated up tea – curry, mash, celery</td>
</tr>
<tr>
<td>19:45</td>
<td>19:55</td>
</tr>
</tbody>
</table>

Figure 62: Sequence 1-6, Kevin, Eating Dinner

Figure 63: Kevin, Diary Day 3
Although the diary study participants were asked to provide the start and end times for their activities, for which many only noted the start time of activities. A majority of participants chose to list a series of tasks within the same time slot; typically tasks were grouped by room or type of activity (i.e. housework). This is illustrated by Figure 65 which shows an extract from Eva’s diary entries where she grouped housework and childcare tasks. In some cases, activities which were not necessarily related were blocked together, usually in steady time increments (such as 5, 15, 30 or 60 minutes blocks). This suggests activities were logged at set times; however it added uncertainty of the sequence of events.

<table>
<thead>
<tr>
<th>Participant: Eva</th>
<th>Time From:</th>
<th>Time To:</th>
<th>Day 1 Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>19:00</td>
<td>19:30</td>
<td>Cleaned the table, loaded the dishwasher, tidied the kitchen, swept the floor.</td>
</tr>
<tr>
<td></td>
<td>19:30</td>
<td>20:00</td>
<td>Helped the children to shower and supervise them getting ready for their bed.</td>
</tr>
<tr>
<td></td>
<td>20:00</td>
<td>20:15</td>
<td>One child read to me.</td>
</tr>
<tr>
<td></td>
<td>20:15</td>
<td>20:30</td>
<td>The other child read to me.</td>
</tr>
<tr>
<td></td>
<td>20:30</td>
<td>20:45</td>
<td>Put the children to bed.</td>
</tr>
<tr>
<td></td>
<td>20:45</td>
<td>21:15</td>
<td>Went downstairs to unload the washing machine and put the clothes in the airing cupboard to dry.</td>
</tr>
</tbody>
</table>

Figure 65: Eva, Diary Day 1

9.14.2.4 Acts, Activities and Goals

Reaching goals or carrying out activities derive from the completion a series of specific acts, therefore these three components of social situations were discussed together. The SenseCam sequentially captured householders conducting a number of these acts, towards the fulfilment of goals (i.e. emptying the dishwasher or
putting the washing machine on). Recording participants’ activities was the major focus of capturing comfort and was the prominent reason as to why the SenseCams were chosen as an observational tool. The SenseCams captured the activities of householders, which were validated through the recollection interviews.

Participants were able to offer further detail of the specific acts behind the activities and the goals they were trying to achieve. Walter was observed multitasking whilst preparing dinner from 17:35 to 18:52, Figure 66 illustrates the process of cooking dinner, whilst other tasks such as emptying the compost bin (image 3), and making a smoothie (image 5), also task place during the dinner making process.

Figure 66: Sequence 1-6, Walter Multitasking
Unlike using the SenseCam, the diary entries did not provide as much detail in regards to the activities they were carrying out. This can be illustrated by Walter’s diary entry for same activity shown below in Figure 67 which simply stated:

<table>
<thead>
<tr>
<th>Participant: Walter</th>
<th>Day 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>From:</td>
<td>Activities</td>
</tr>
<tr>
<td>17:15</td>
<td>Got home from work put kettle on to make a cup of tea. Change into comfortable clothes. Relax and watch TV New.</td>
</tr>
<tr>
<td>18:30</td>
<td>Start to cook dinner</td>
</tr>
<tr>
<td>19:05</td>
<td>Have dinner with my wife</td>
</tr>
</tbody>
</table>

Figure 67: Walter, Diary Day 1

Participants were not necessarily expected to list a series of individual acts, they were asked to list their activities which did not necessarily mean the individual actions which led to the activities or accomplishment of their goals. The self-completion diaries were therefore lacking in this type of detail, but not through the fault of the participant.

In regards to capturing comfort in the home, identifying actions which result in comfort was paramount. By using the SenseCam it was possible to identify such actions; for example, Kevin had stated listening to music which was a comfort activity for him; prior to showering he could be observed plugging his phone into a radio to play music; thus also capturing the audio of the comfort experience, see Figure 68.

Kevin: “Oh actually, ok this is me about to have a shower, that’s the bathroom, that’s a little radio upstairs and I’m plugging my phone into... So you can see that I’ve set it up as a little music player now.... I just listen to something all the time, I always have something on.”

Figure 68: Kevin, Listening to Music
9.14.2.5 Objects

Clearly, householders’ everyday lives involved interacting with various types of objects. The very position of the SenseCam provided a view of participants’ hands and the various objects of which they engaged with around their home. Participants were observed conducting comfort making activities such as reading, using blankets, sitting and controlling the comfort of their environment. In fact both Maria and Walter were observed turning up the temperature on their heating systems soon after arriving home; this was captured in one single image, stressing how quickly certain actions were conducted and how easily they could be missed.

![Figure 69: Maria, Adjusting the Thermostat on the Heater](image)

It was also possible from the camera view to see participants’ sitting positions; this was particularly significant as sitting and lying down was frequently associated with comfort. The camera showed participants unwinding in different positions on the sofa and in bed, for example Rachael could be seen lying down on the couch and reading, while Maria could be observed curled up on the couch; see Figure 70.
In the diaries, participants did make note of the objects with which they interacted with through the activities they recorded. Similarly to logging the specific acts for each activity, detailed descriptions of objects were not always recorded by the participant; although the impression was given that if the object was relevant to the tasks or significant to their comfort experienced in the situation then they would be more inclined to record it. For example, in one of Rachael’s diary entries she scribed the following, mentioning the use of a blanket on the sofa:

<table>
<thead>
<tr>
<th>Participant: Rachael</th>
<th>Time From:</th>
<th>Time To:</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>18:40pm</td>
<td></td>
<td></td>
<td>Sitting in bed with duvet, over knees, doing reading for work CPD course tomorrow (and on FB on phone for break!) Son came into do Hama beads beside me again</td>
</tr>
</tbody>
</table>

*Figure 71: Rachael, Diary Day 3*

**9.14.2.6 Feelings**

Feelings were expressed during the recollection interviews; the process of viewing the images evoked descriptions of how participants felt at the time. Participants referenced how they felt, typically using comfort related words such as ‘relaxing’. The remarks occurred naturally without prompting from the interviewer and typically happened as participants appeared to be recalling events, rather than from knowing their routines. Jessica mentioned how she was relaxing, eating her dinner in front of the TV as she knew she would be busy later that evening, while Maria mentioned how relaxed she was sitting on her sofa with wine and a snack, see Figure 72. Due to the position of the camera, it was not possible to view
participants’ facial expression which could have potentially given an additional insight into their feelings:

![Image of a person unwinding](image)

Jessica: “This is me, like my girlfriend was coming over that night and I had loads to do so I wanted to kind of, like I like watching Home and Away and Neighbours when I have time to watch, I like that real chill out of watching something really shit, so I kind of have that kind of twenty minutes to myself... it was just a bit of time to myself, to sit and eat before I knew I had to rush around again.”

**Figure 72: Jessica, Unwinding**

A majority of participants didn’t log their feelings within the diaries, Rachael did note feelings of tiredness and those of her children occasionally, as Figure 73 illustrates Rachael notes feeling of tiredness and also feeling comfy:

<table>
<thead>
<tr>
<th>Participant</th>
<th>Day 2 Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rachael</td>
<td></td>
</tr>
<tr>
<td>Time From:</td>
<td>Activities</td>
</tr>
<tr>
<td>16:00</td>
<td>Kids watching rubbish so upstairs into computer room, on computer – Facebook, Scrabble.</td>
</tr>
<tr>
<td>16:20</td>
<td>Tired, so into bed, trousers off to be more comfy.</td>
</tr>
<tr>
<td>16:40</td>
<td>8 year old joins me for a cuddle up, dressing gown on (more comfy)</td>
</tr>
</tbody>
</table>

**Figure 73: Rachael, Diary Day 2**

### 9.14.2.7 Actors

Interactions with other people can take various forms with current technology and this was witnessed with the SenseCam use; face-to-face interactions were captured as well as interactions on mobile phones, texting and communicating via social
media were also observed. Face-to-face interactions were seen between participants and other householder members, typically talking or eating meals together. Kevin could be seen playing table tennis with his son, during the recollection interview he gave details of the activity, he stated:

Kevin: “This is playing table tennis with [son]. So it’s a red table... we re-matched actually, we swapped ends because it’s not too good down at this end because you tend to lose the ball...”

There were moments where it was not possible to capture the presence of other householders during activities such as watching television due to the position of the camera. However, the recollection interviews offered the opportunity to gather this information; for instance, during Mike’s evening, he was observed sitting down, eating and watching a TV drama. Due to the position of the chairs, his wife was not seen, but his wife’s presence was established during the recollection interview where Mike repeatedly referred to himself and his wife as ‘we’ throughout:

Mike: “Right that’s in the lounge; we would have been chomping our way through the melon. I think looking at this I’m watching TV... there’s some drama-ry type thing on, so we would be watching programmes like Silk. So this would have been in this sort of period.”

Figure 74: Mike, Shared Viewing
The position of the camera meant phone usage was frequently observed, some participants could be seen using their phones for texting and communicating via social networks on and off through the evening typically whilst sitting on the sofa; emphasising the ease of communication with the outside world; Figure 75 shows a selection of images of participants using their phones. Many interactions with smart phones were visible, but using phones for calling was not in viewing range of the SenseCam, so unfortunately this type of activity cannot be captured through this particular observation tool.

Figure 75: Jessica, Olivia and Rachael Using Smart Phones

The self-completion diaries also saw the logging of the presence of other householders, this included activities such as talking with others, eating with others or shared viewing. When participants were not directly interacting with others, it was questionable whether the presence of other people had actually been noted, especially in the cases of shared viewing. The information was generally offered irregularly, throwing doubt onto whether other household members were present during these activities. Some participants recorded making phone calls and messaging people; Pauline noted called her daughter to check on her grandchild, whilst Sade shared viewing with her mother, ringing her partner and messaging her brother, see Figure 76 and Figure 77:
<table>
<thead>
<tr>
<th>Participant: Pauline</th>
<th>Day 2</th>
<th>Time From: 4:05</th>
<th>Time To: 4:30</th>
<th>Activities</th>
<th>Rang daughter to check on her and grandchild.</th>
</tr>
</thead>
</table>

Figure 76: Pauline, Diary Day 2

<table>
<thead>
<tr>
<th>Participant: Sade</th>
<th>Day 2</th>
<th>Time From: 7.00</th>
<th>Time To: 7.35</th>
<th>Activities</th>
<th>Ate dinner in front of TV in living room with Mum watched the news</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>7.35</td>
<td></td>
<td></td>
<td>Got laptop and re-joined Mum on the couch in the living room. Continued watching TV. Sent emails</td>
</tr>
<tr>
<td></td>
<td></td>
<td>11.10</td>
<td></td>
<td></td>
<td>Called [partner] on mobile while messaging [brother].</td>
</tr>
</tbody>
</table>

Figure 77: Sade, Diary Day 2

9.14.2.8 Summary of Capturing Comfort

Through both the visual images and text, the interactions between participants and the dimensions of their home environment could be understood. Both tools captured across the 8 dimensions, although this was varied especially with the diaries. The SenseCam appeared to have strengths in capturing space, time, acts, activities, goals, objects, whilst the diaries showed strengths in recording activities, goals, and actors in the home environment.

9.15 Discussion

The discussion will be divided into two sections; firstly how comfort is experienced within the daily routines will be discussed, drawing upon the main themes emerging from the data. The second section will present the scope of data captured by the self-reporting observational tools.

9.15.1 Comfort in Daily Routines

Householders were able to record observations of their daily routines through self-reporting tools, in the use of the diaries householders recorded a variety of activities they conducted some of which were potentially comfort making activities,
and with the SenseCam it was possible to see the activities of participants’ and identify the potentially comfort making activities. Records were fairly unchanging across the days recorded for each householder, emphasising the routine nature of their after work activities.

After work routines started for a majority of householders, with the task of changing from work clothes which for some householders was associated with comfort. Changing clothes could be seen as forming a physical boundary between work and home life. During study 2 householders were asked whether their commute home helped them transition from work to home, the general consensus across both focus groups was no, and in addition to this, a majority of householders noted they sometimes think about work at home and take work home with them. It would appear for many of the householders, the boundaries between home and work life are blurred, it may be challenging to maintain separation mentally and physically between the two worlds, changing clothes in the evening is a simple way of providing distance between the home and work environments which would explain the habitual nature of this action at the beginning of the evening (Nippert-eng 1996).

For a majority of householders the early stages of their routines consisted of completing necessary tasks (i.e. cooking dinner). Comfort was experienced but for short periods, unlike towards the end of the evening where comfort was more prominent. This corresponded with the findings of study 2 where a majority of householders stated they found necessary tasks (i.e. cooking, chores and repairs) obstacles to experiencing comfort. It would appear necessary tasks are more rigid and inflexible in nature, whilst comfort activities are typically more flexible and can frequently be arranged around necessary tasks.

The main comfort activity carried out by householders during their daily routines was sitting down and watching television, suggesting householders are fairly inactive in their pursuit of comfort after work. The prominence of watching televisions corresponds with both studies 2 and 3 where householders associated watching televisions with unwinding. Research conducted by the Energy Saving Trust has found, on average, UK households watched 6 hours of TV a day (per
household) which would suggest that TV watching in the evening is a common activity nationwide (Energy Saving Trust 2010). Traditionally, watching television has been viewed as a passive and inactive pastime; however research has shown that TV watching can actually be quite an interactive and dynamic activity (Obrist et al. 2008; Gauntlett & Hill 1999). As this study has shown, some householders who watched television to unwind in the evenings did so with a partners and family members; shared viewing is likely to encourage social interactions by providing a shared discussion point. It is also worth noting, which was particularly visible with SenseCam use, that people rarely just sat down and watch television, it was frequently combined with other tasks, householders also regularly moved in out and out of the rooms also adding the notion that TV viewing is not necessarily passive (Gauntlett & Hill 1999).

Potential comfort making activities were successfully identified through the use of both self-reporting observational tools and the personal comfort summaries. The identification of comfort making activities towards the end of the evening, and its placement within routines after necessary tasks had been completed, suggests the householders may strive to achieve comfort throughout the evening (Shove 2003b).

9.15.2 Capturing in Context

Both observational tools were able to capture the 8 examined dimensions of the home environment to varying degrees, providing representations of daily routines of the householders. During the reviewing stage of the study (when the researcher reviewed both SenseCam and diary data prior to the interview), the visual data offered a clearer picture of activities and routines than the diary text alone. During the interview stages, as expected, the SenseCam recollection interview evoked more additional insights, as participants were narrating whilst viewing their daily routines and consequently was a more emerging stage of the interview process. The diary-interview offered clarification but it was challenging to gain further insights into the activities which occurred.

The SenseCam had the advantage of providing much of the details regarding the activities of the householders and their environments through visual cues; this level
of detail would not have been possible for participants to record by hand in the diaries. The strength of the SenseCam images was most prominent in capturing the individual acts of householders (i.e. turning the heating up, the steps to cooking dinner). For the purpose of this study, the key level of detail required was the activities of householders in order to identify those which were potentially comfort making. Both the diary and SenseCam method provided this level of detail, and activities were identified throughout. As stated in the findings, activities were often grouped together which brought into question the sequence of events, it was also noted the self-reporting diaries rely heavily on the participants’ judgement of what constitutes a recordable activity. The automatic nature of capturing data for the SenseCam provides an accurate sequence of events, from a researchers perspective it is also more reliable than the diary-interview in terms of recording all activities. The point of view angle of the SenseCam captured household interaction with various objects including smartphones, computers, etc.; participants also recorded activities in the diaries which identified the objects they were interacting with, such as making phone calls, unlike the SenseCam where this data would have been missed due to the position of the camera. Although, as viewed within the SenseCam data there were several instances where participants were using their smartphones in front of the camera, which took place throughout the after work routines; this was not noted to the same extent in the diaries, which is likely to suggest this activity was not logged by the participants’.

As described previously in the methodology chapter (section 4.4.4.1), SenseCam recollection interviews produced both instances of remembering and knowing. This was no different in this study, there were clear instances where participants were initially unsure of their activities, but moments later were able to offer an explanation signifying remembering, whilst knowing through the habitual nature of their routines was also captured. Interestingly on many occasions during the recollection interview, participants attempted to guess what they would do next suggesting their routines are quite unchanged. Participants were interviewed up to 3 weeks after the use of the cameras which didn't appear to affect their ability to remember or know their routines. Similar findings were found in a study examining
life-logging and memory; participants were interviewed at different intervals between 3 days to 4 months after using the SenseCams. Their findings suggested there was no difference in remembering or knowing after long periods of time (Sellen et al. 2007).

The SenseCam and Vicon Revue Desktop software suffered various technical issues which unfortunately results in data being less accurate and less reliable. One of the issues encountered was the timestamps on the images being erased, efforts were made to try and retrieve this data, but the Vicon support team were unable to offer any successful solutions. Although, for the purpose of this research it was not paramount to have the exact time, it was unfortunate that some of the SenseCam data lost the accuracy, a quality which initially made it such an attractive tool. They also suffered technical errors whilst in use, which was difficult for participants to know had taken place until the images were reviewed by the researcher. In such instances, participants used the camera again; for this particular research into daily routines this was not a significant issue however it did weaken the reliability of the tool.

9.15.3 Reflections

The observation tools have been discussed in detail within this chapter, this section will focus on the approach the researcher’s role and the process of conducting this study.

This study used self-reporting ethnographic tools to capture comfort in context, this was aided by the phenomenological approach adopted by this research, using this approach allowed for the comfort seeking activities to be fully explored (through studies 2 and 3) followed by establishing where comfort takes place within the everyday routines of householders’.

Participants were recruited through a purposive sampling strategy and as a result the researcher had various associations with all the participants beforehand (i.e. work colleagues, family friends, etc.) which led to a comfortable and friendly introduction to the research. The initially interaction between researcher and
participants for this research process started during the focus groups of study 2, this allowed for the researcher to begin to build a rapport with the participants through the discussion of key aspects surrounding comfort and everyday routines for this study and preceding study 3. As a novel tool the researcher was uncertain as to whether a majority of participants would consent to using an automatic point-of-view camera for an evening. Fortunately most participants used the SenseCams, and many reported feeling comfortable wearing and using it, even to the point of forgetting it was on.

All participants were given the opportunity to view the images prior to the researcher, in case they had any concerns in regards to the content of the data, however no participants found this necessary. Therefore participants viewed the images for the first time during the recollection phase of the data collection with the researcher at their home. Watching the stop frame video with the researcher appeared to be a comfortable process for participants who frequently gave further details surrounding the visual cues.

As previously stated there were a number of technical issues experienced during the use of the SenseCam, one of which resulted in the camera’s failing to record images. In such cases participants were asked to use the cameras again, fortunately in all cases participants were willing to do this which have been as a result of the rapport which the researcher had built up with participants through previous interactions in particular the study 2’s focus groups.

The main purpose of this study was to determine when comfort takes place at home. In doing so, comfort making activities were identified using the personal comfort summaries developed from the previous stages of this research. Member checking was conducted with a small number of participants in order to reduce the threats to validity. Member checking verified that the comfort making activities previously identified were indeed the occasions where householder were potentially experiencing comfort. It would have been ideal to complete member checking with all participants, however, the procedure for this study was also conducted alongside study 2 and 3 resulting in repeated interactivity between
researcher and participant, with this in mind, it seemed sufficient to use the comfort-seeking activities obtained during study 2.

Time management of the interview process was paramount as there were three main aspects of the data collection process which were being addressed through the interview; this included the photo elicitation interview (for study 3), the recollection interview for the SenseCam and the diary-interview. A key feature of the SenseCams was the Vicon Revue Desktop software which allowed the images to be viewed at various speeds, however allowing participants to control the speed during the interview, frequently resulted in the recollection stage of the interview taking longer than expected as they would pause to explain what was happening. Although this was valuable information, it was also challenging to control the timing of this stage of the interview.

9.16 Conclusions

To recap, the purpose of this study was to determine when comfort making activities take place in the everyday lives of householders with the use of two observational tools. With the data gathered in previous studies, the potential comfort activities of householders could be established and determined within the daily routines. Comfort appeared more prominently in householder’s daily routines towards the end of their evenings once necessary tasks had been completed. Although a number of householder activities were identified, for a majority, the major unwinding activity after work was watching television.

The second purpose of this study was to examine the scope of two self-reporting observational tools; the SenseCam and self-reporting diaries. The two observational tools were compared on their ability to capture the observable dimensions of home life. Both had their strengths and weakness; however the SenseCam offered greater detail than the self-reporting diaries. For understanding the routines of householders, the use of SenseCams was engaging for both participants and researcher. For the participant the use of visual cues evoked further details of their routines, for the researcher, they became immerged in the
world of the participant seeing through their eyes and understanding the relationship between the components of their home life.
Chapter 1: Introduction

Chapter 2: Literature Review

Chapter 3: Research Paradigm

Chapter 4: Methodology

Chapter 5: Exploring Householders’ Perspective of Comfort in the Home

Chapter 6: Household Profiles

Chapter 7: Insights into Comfort and Daily Routines

Chapter 8: Exploring Psychological Dimensions of Comfort in the Home

Chapter 9: Capturing Comfort in Context

Chapter 10: Discussion: A Classification of Domestic Comfort

Chapter 11: Conclusions and Future Work

Chapter 12: References

Chapter 13: Appendices
10 Discussion: A Classification of Domestic Comfort

10.1 Introduction

The research conducted for this thesis set out to investigate the multiple dimensions of domestic comfort and to generate a classification of domestic comfort.

Up till this point, this research has identified multiple factors which are associated with the experience of comfort within the domestic environment. This included firstly, exploring the meaning and creation of comfort from the householders perspective; as a result a wide scope of attributes associated with experiencing comfort in the home were identified. These were categorised into four main themes, namely environment and physical comfort, aesthetics and perceptions of space and order, psychological wellbeing and interactions and activities. An in-depth exploration of the psychological dimensions of domestic comfort, was then conducted using Heijs and Stringers (1987) four dimensions of comfort, which were identified as perceptual, interactive, personalisation and facilitative comfort. Finally this research captured comfort within the everyday routines of householders. As a result of the research conducted so far, several attributes of comfort have been determined to be significant to the meaning and creation of comfort.

In this chapter the second stage of the aims will be addressed, to generate a classification of domestic comfort. The literature and the findings from the studies conducted in this research will be drawn upon to support the development of a holistic notion of comfort.

10.2 Classifying Domestic Comfort

As previously stated several dimensions of domestic comfort have been identified through the literature and the findings of the studies conducted for this research. The classifications system begins by recognizing three high-level dimensions
paramount to comfort in the home environment, these are the *meaning of home*, the *home environment* and the *comfort experience*. These three dimensions are not presented as independent components of comfort, rather, as dimensions which are intertwined to create daily instances of comfort which together create a comfortable home. Within each level more specific dimensions have been identified. Each dimension will be outlined highlighting the key aspects which have emerged from the findings.

<table>
<thead>
<tr>
<th>Meaning of Comfort at Home</th>
<th>Home Environment</th>
<th>Comfort Experience</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freedom of Action</td>
<td>Aesthetics</td>
<td>Physical Comfort</td>
</tr>
<tr>
<td>Control</td>
<td>Spatial Dimensions</td>
<td>Psychological Wellbeing</td>
</tr>
<tr>
<td>Security</td>
<td>Order</td>
<td>Activities</td>
</tr>
<tr>
<td></td>
<td>Ambience</td>
<td>Interactions</td>
</tr>
<tr>
<td></td>
<td>Environment Conditions</td>
<td></td>
</tr>
</tbody>
</table>

*Figure 78: Classification of Comfort*

### 10.2.1 Meaning of Comfort at Home

As previously discussed in the literature, the home holds a number of qualities which differentiate it from other spaces people encounter, such as work or public environments. Although there are number of factors which have been identified as significant to creating a home; in terms of creating comfort, freedom of action, control and security appear to be the most significant (Sixsmith 1986; Smith 1994; Altman 1975; Heijs & Stringer 1987). These three aspects appeared to be at the root of many of the choices made by the householders when at home.

**Freedom of action:**

This dimension refers to the freedom and ease of conducting various activities in the home. The importance of freedom of action was most prominent in study 3, during householders’ identification of facilitative comfort. Householders identified
ways in which their homes allowed them to conduct various activities, both enjoyable and necessary. Householders also discussed the ways in which they have been able to change their homes in terms of renovations, décor, etc. Freedom of action also draws upon knowledge of other householders’ activity patterns, as this may impact on their own experiences of comfort, which was also noted during study 4.

**Control of the environment:**

The home environment typically offers the householders the ability to control various aspects of their environment, similarly to freedom of action this typically differentiates the home environment from other places such as work and public spaces (Altman 1975). The ability to control the multiple aspects of the environment including visitors to the property and environmental parameters such as temperature and light, are essential parts of home. The efficiency of the implemented system or tools to control the conditions (i.e. boiler, wall insulation, etc.) in the home will play an important role in defining the sense of control householders feel they hold. In study 1, participants were occupants of solid wall properties, known to be hard to heat and it was clear for some, retaining heat was a challenge, hindering their control of environmental factors, participants couldn't rely on the system in place and instead found alternative ways to keep warm i.e. extra clothing, using an open fireplace.

**Security:**

Maslow’s theory of motivation sets outs a number of needs which humans are motivated to achieve, security and safety are considered to be a fundamental human need, once basic physiological needs are met (Maslow 1970). Within this research the significance of security was initially drawn upon within the first study, where householders attributed security to the meaning of comfort. Similarly, in identifying the essential qualities of the home Smith (1994) found participants in her study stated security was a significant quality of a home.
10.2.2 The Home Environment

This dimension includes attributes of the surrounding environment, which are fixed such as spatial dimensions, and those which are more flexible such as order and environmental conditions. All aspects were identified across all four studies to varying degrees, in studies 1 and 2 aspects of the thermal conditions were identified prominently, whilst study 3 identified the significance of aesthetics, order, atmosphere and spatial dimensions. Study 4 visually captured several aspects of the home environment that impact on the creation of comfort.

Aesthetics

Personalising the home to householder taste or creating a space which is aesthetically pleasing has been associated with the creation of a comfortable home. A majority of the participants in study 3 were able to identify personalisation comfort drawing on various ways in which they had stamped their mark on their property. As suggested in the discussion of chapter 8, there appears to be large and small scale personalisation occurring within the home. Large-scale personalisation referred to changes resulted from large renovation projects such as extensions or changes to the décor, whilst smaller-scale personalisation appeared to be in the display of cherished belongings and photographs. Householders who personalised their homes which they shared with their partners or families did so by ensuring the style was mutually appealing to all; modern, cooling, warm were just some of the styles in the homes described by the householders. Aesthetics of the surroundings are not dissimilar to personalisation, however in study 1 householders tended to refer to the aesthetics of the surrounding rather than specific ways in which they had personalised the area. In studies 1 and 3 householders expressed the enjoyment in doing the work themselves; the process of personalising their surroundings gave them the opportunity to bond with the property.
The dimensions and layout of space within the home shapes the way in which a householder can create comfort and their perception of space. Four aspects of space were discussed frequently in studies 1 and 3, which were having enough space for various tasks, being able to adapt spaces and furnishings to accommodate different uses and having rooms which provided multiple functionalities. The householder's subjective judgement of space were made based on the layout of rooms, and the sense of order in the environment (which will be discussed in further detail in the next section) which means the association of qualities such as small, large, or open may not necessarily be based on the actual size. The difference between perceived and actual size of rooms can be influenced by the layout of the furnishings and shape of the room, research has shown there can be significant variation between the actual room and the perceived room sizes of properties (Atlaş & Özsoy 1998; Oseland & Raw 1991). The three attributes identified are considered to be interlinked; having enough space may require the adaption of spaces through the use of adaptable furnishings and therefore leading to the creation of multifunctional spaces.

Having enough space to conduct the various activities which are carried out in the home was mainly identified in study 3, where householders referred to a variety of interests which required them to have enough space, such as scrapbooking and, DIY projects. The ability to adapt space was fundamental to most householders making the most of the rooms in their property. Spaces were adapted by moving and using adaptable furniture (i.e. sofa beds) to change the usage of the room. The process of adapting the space was sometimes referred to as creating extra space. This was mainly referred to in study 3 where householders typically adapted spaces infrequently for socialising. Rooms could easily be changed by using multifunctional or adaptable furniture, this was especially important if space was
noted as limited. For instance one householder labelled one room in her home as the dining room, computer room and spare bedroom, all functions made possible by adaptable furnishings.

The idea of order in the home is provided by the way in which furnishings and belongings are organised within the environment. Maintaining a tidy environment was part of upholding order within the home, similarly to spatial dimensions, order was subjectively judged by the way householders make sense of the environment. Within the studies householders associated qualities such as cluttered/uncluttered or tidiness/untidiness with their level of comfort. Additionally householders discussed the importance of having set and convenient places for items they used regularly and also the value of having extra storage space for items used less frequently. All three attributes of order were closely linked and householders frequently discussed these in association with each other. Keeping things in place required enough storage space; householders in study 3 discussed how they used certain areas of their home mainly for storage such as attics and spare bedrooms. Also in study 1, references were made to maintain order and tidiness in frequently used areas suggesting the containment of clutter to certain areas of the home did not impact on their comfort (Swan et al. 2008). Others discussed insufficient storage at home and used multipurpose items to try and tackle this issue (i.e. footstool with storage inside). Householders in study 1 and 2 felt untidiness or clutter acted as barrier to actually achieving comfort, expressing a preference to tidy their environment in order to be able to experience comfort.

There was also references to keeping frequently used items such as phones and keys, in set places which were easily accessible and convenient with everyday life. In fact during study 3, one householder expressed that having everything in a convenient and accessible place was his ideal experience.
The ambience of the environment was drawn upon frequently by householders over the course of this research. Ambience is defined as ‘the atmosphere of place’ (Collins online, 2013) and derives from the feeling or impression that the environment has for a householder and the subsequent behaviour it affords. This was identified as part of perceptual comfort by Heijs and Stringer who described the relationship between the stimulus in the surrounding environment and the sensation it creates, drawing upon the qualities identified within the work of Pennartz (1986). It is the qualities of the surrounding environment such as the dimensions of a room or the use of an open fireplace which provides the householder with an impression of, for example, spaciousness or cosiness. Householders made references to this whilst describing perceptual comfort in study 3 and also in describing the meaning and creation of comfort in study 1. The sub-categories identified here are stimulus and sensation; these are undeniably linked as the surrounding stimulus leads to the sensation experienced by the occupant. The dependency of the relationship between the stimulus and sensation were discussed as contributing the comfortable experiences alongside other attributes. Within the first study most of the references were made towards the use of an open fire place, householder drew upon the aesthetics of using an open fire rather than the thermal qualities more prominently associated with its use; they discussed how it contributed to creating a comfortable atmosphere in the room whilst also noted other aspects of the experience, for instance, sitting comfort. The comfort experiences shared by householders particularly in the exploration of Heijs and Stringer’s taxonomy were often a combination of stimuli which provided a multi-sensory impression of the current environment or moment being experienced. For instance one householder described how he could sit in a comfortable chair in his kitchen and enjoy the perfect view of his garden whilst eating his dinner or reading the newspaper because he had everything he needed
conveniently close whilst another described how she could create comfort during the summer in their conservatory by sitting and relaxing after the sun had passed enabling her to enjoy the cooling, spacious environment. What was clear from the findings was different stimulus created different sensations and thus provided a different ambience to the environment.

Much is already known about the environmental conditions of comfort as they feature prominently in environmental literature and thermal comfort is dominant within this literature. Within this research, participants discussed thermal conditions much more frequently, than sound and lighting. References to the thermal conditions were frequently the initial response from householders when questioned about creating comfort in study 1 and during the focus groups in study 2, suggesting thermal conditions played a prominent role in comfort from the perspective of the householders.

Thermal conditions were featured within studies 1, 2 and 3, typically in regards to the room temperature. Householder expressed their preferences, particularly for warm environments, and described ways in which this would be achieved. Keeping a warm environment was a significant part of creating comfort in study 1, potentially due to the hard to heat nature of solid wall homes (Vadodaria et al. 2010). Throughout the studies participants described multiple ways in which they created and maintained a warm environment for example using a fireplace, putting the heating on or putting on extra clothing (clothing will be discussed in comfort experience). Householders also made references to their expectation for variation in indoor temperatures across seasons across studies 1, 2, and 3 to expecting variation in indoor conditions across the seasons, that is, warmer in the winter and cooler in the summer. This follows the thinking behind the development of the adaptive thermal model of comfort which suggests indoor temperatures should
match occupants thermal expectations, and these expectations may be influenced by climate, social and cultural dimensions (Brager & de Dear 1998; De Dear & Brager 2001). The use of natural lighting for warmth was referred to by householders as they discussed the use of their conservatories and blinds to let in more light particularly during the warmer seasons. Further behaviour changes in response to seasonal variation are discussed in the comfort experience section. Other environmental conditions were also discussed, however not to the extent of thermal conditions. A small number of householders across the studies referred to different types of lighting conditions, including controlling the amount of natural light through the use of blinds to shutting out all light in the creation of a privacy space.

Sound was referred to in two main ways across the studies, firstly in terms of peace and quiet which was related to a comfortable experience; it was also associated frequently with privacy in study 3, this association will be discussed further in the section on privacy. Secondly, sound was discussed in terms of background noise, in the focus groups in study 2, householders made references to using their television as background noise when alone. Providing a sense of business or activity around the home is an unintentional function of a television set and essentially turns it into a piece of furniture rather than its typical purpose to provide entertainment. This draws similarity to a study conducted by Gauntlett and Hill (1999), where one diarists taking part coined the phrase ‘electronic wallpaper’ to describe how he would have the television on but wouldn’t be watching.

10.2.3 Comfort Experience

The term ‘comfort experience’ has been used in this instance to refer to the creation and achievement of moments of comfort. This is achieved in a number of ways including householders’ response to environmental conditions, the enjoyable activities and social interactions which householders engage in and also the psychological wellbeing associated with a achieving a relax state of mind. The perceived quality of householders comfort experiences relied heavily on the previously identified dimensions. For example, freedom of action could influence
the type of activities householder feel they can conduct in their home; limited freedom of action could be attributed to restricted room space (spatial dimensions), which in turn may prevent householders from conducting certain activities. In this section the instances of comfort experience will be discussed with reference to the meaning of comfort and home environment which have been identified so far.

Physical comfort refers to the behaviour of the occupant in achieving a comfortable body state. Environmental conditions are likely to have the heaviest impact on the physical comfort householders are able to achieve, for example the strong link between thermal conditions and thermal-related behaviours. The householders are likely to have a physiological response to the environmental conditions as discussed in the previous section, which may result in a change in their behaviour. Both sitting and lying postures were discussed in terms of creating comfort across studies 1, 2 and 3; and householders were captured frequently in study 4 creating comfort from a sitting position. It was frequently associated with other activities, such as reading or watching television and these were very much a contributing factor towards the overall comfort experience. The sitting positions visibly captured in study 4 were not always the ones afforded by the design of the chair. Householders could be seen curled up on the sofa, this could potentially be a response to being cold, as curling up reduces the surface area and heat loss (Nicol et al. 2012; de Looze et al. 2003; Teraoka et al. 2005).

The term thermal-related behaviours refers to those which appear to be adaptive responses to the thermal environment, however it is also noted that such changes in clothing or sitting positions may also be derived from other non-thermal aspects. For example, in study 3, bathing was described as a way in which householders could have privacy from others, alongside this they noted that bathing also provided warmth. Achieving thermal comfort may not have been the focus of the behaviour conducted; rather thermal comfort was just one attribute of the bathing
experience. Householders did make direct references to putting on extra clothing, using blankets as ways to keep warm. Such behaviours did not necessary derive from a lack of control or an inefficient heating system but rather appeared to be a convenient response to thermal dissatisfaction with the environment; this was noted by householders in both studies 1 and 3.

Variation in behaviours helped householders achieve comfort in different ways across the seasons, through more outdoor activities during warmer weather but also through utilising different parts of the indoor space to enjoy the natural warmth from the Sun, as indicated in study 3 where householders with conservatories noted they used them more in the summer than in the winter, but also through daily weather changes, conservatories were particularly responsive to changes in usage. The findings support a growing movement towards recognising ‘change’ in the design of new buildings, including changes in occupant behaviour, changing weather and seasons and changes in building use (Nicol et al. 2012).

The attributes of the psychological wellbeing dimension are those which are connected to householder’s current state of mind. Across studies 1, 2, and 3 householders associated the feeling of comfort with aspects of psychological wellbeing. The word ‘relax’ was used frequently by householders to express the feeling that their comfort experience provided them with; it was considered a sensation connected to both the mind and the body.

In reference to psychological wellbeing householder frequently made references to obstacles which prevented them from being comfortable. In study 1 householders referred to being stress or worry free, as part of being able to create comfort whilst, householders expressed how having tasks which they had to complete or having an
untidy environment would prevent them from being able to get comfortable, but once the obstacle had been removed (i.e. tasks had been completed) householders could achieve comfort.

Relaxation and privacy were associated during study 3 where householders described various ways in which they could be private as well as relaxed, this was also associated with activities such as bathing and reading. Householders expressed a desire to have privacy or disconnection from the outside world and the rest of the household in order to have a moment to themselves. Privacy can be seen as a way of regulating social interactions, the desire for privacy may not always match the actual privacy obtained especially within a shared home it may be difficult householders achieved privacy through various ways such as switching off from electronic communication, closing or locking themselves away for activities such as bathing, suggesting this may have felt like justified time alone (Altman 1975).

Definitions of comfort in the literature have frequently drawn upon its psychological nature; referring to comfort as a state of mind which is affected by the environment (Parsons 2003). Despite this, it not known how much the psychological state directly affects experiences of comfort.

Various activities were identified through studies 1, 2, and 3, and captured during study 4. Householders conducted a number of these activities in order to unwind, these included activities which were rewarding or challenging, these were considered to be intrinsically motivated activities, pertaining to a desire to learn or challenge oneself (Ryan & Deci 2000). During the focus groups in study 2 there was the opportunity for householders to describe how they unwind after work to which many included everyday routine activities and predominantly watching television.
The findings of study 4 showed the most common activity for unwinding after work was watching television. As previously noted, watching television is not necessarily a passive activity, it can also be considered as a social activity as many noted watching television with other householders (Gauntlett & Hill 1999; Obrist et al. 2008). Other activities included those which were challenging or rewarding, across studies 2 and 3 householders shared unwinding activities, including scrapbooking, playing the guitar and even exercising. The activities conducted by householders in the home occasionally had strong ties to the characteristics of the home environment; especially activities such as exercise which required ‘extra’ room for which spaces were adapted.

Social interaction at home took various forms from brief communications with householders, to shared dining, to socialising using game consoles; it was discussed across studies 1, 2 and 3, and captured in study 4. Social interactions took place with householders and guests to the home. In study 1, householders discussed entertaining, and being able to have people around as attributes of creating comfort. Having enough space or the ability to adapt spaces to accommodate entertaining guests was noted strongly in study 3 through interactive comfort. This draws attention to the significance of the characteristics of the home environment, the space available dictating whether certain social interactions can even take place (Heijs & Stringer 1987; Oseland & Raw 1991).

Communal rooms were associated most with social interactions, the relationship between social interactions and privacy was noted mainly in study 3 through interactive comfort. They identified ways in which their home environment provided them with interactive freedom; householders could choose when they
wanted to be private (i.e. closing doors, or spending time in private rooms) and choose when householders wanted to be more social typically in communal spaces. Capturing comfort identified householders using smartphones to socialise through texting, Facebook, Twitter, etc. Householders could be viewed briefly checking their phones throughout their after work routines, and for many always having their phones conveniently close. The convenience of social interactions through mobile devices changes the notion of interactive comfort outlined by Heijs and Stringer (1987) in that interactive comfort could be today easier to achieve with the aid of technology. This also draws upon the comfort of convenience in everyday life; Shove (Shove 2003b) suggests mobile devices are a form of hypermodern convenience which allows people to achieve goals quicker. Applying this to social interactions through mobile devices in the home, householders are achieving interactive comfort in more convenient ways which could potentially be reducing the need to socialise face-to-face with other householders or guests.

10.3 The Bigger Picture

The classification presented in this chapter has been based on a selective sample of householders; however this research has captured the intertwined nature of the multi-dimensional system and how the dimensions identified mutually influence one another in the creation of a comfortable experience. This section will consider how the identification of the dimensions associated with householders comfort can contribute to understanding the issues raised in the literature review, these being, a) a lack of understanding of how domestic comfort is experienced, and b) lack of holistic approaches to exploring comfort.

Academics from various disciplines concerned with addressing climate change have recognised the need for an holistic approach to comfort (de Dear & Brager 1998; Cole et al. 2008; Shove 2003b; Nicol & Stevenson 2013; Moezzi & Lutzenhiser 2010; Stern 2011). An adaptive approach to thermal comfort goes some way to recognising the psychological and socio-cultural aspects of the thermal comfort experience by identifying the significance of occupants’ expectations and the varying climatic conditions. This research has supported this notion, and the
dynamic nature of occupants behaviour, De Dear and Brager (1998) suggest building occupants are not passive but rather active in their pursuit of thermal comfort, which in this research, was clearly identified in the various ways in which householders created thermal comfort, for example, the use of extra clothing, the use of fireplaces, moving to different areas of their home for warmth. The findings have also recognised that there are several reasons for actions which could be considered thermal-related behaviours, for example wrapping up in a blanket on the sofa may keep a householder warm, but it may also be motivated by a desire to feel cosy, secure, or to relax.

The findings from this research have repeatedly shown thermal comfort to be only one aspect of an overall comfort experience. To return to the previous example, a householder may wrap up in a blanket on the sofa (potentially for thermal comfort), they may also be lying down (for sitting comfort), and watching television (as an unwinding activity) with the family (providing social interactions through shared viewing) which all contribute to the overall comfort experience. If comfort is achieved by the experience of several different factors, the isolation of one factor may give a limited understanding of householders’ satisfaction. This draws similarity to Humphrey’s (2005) work, his analysis of a large number of environmental surveys on thermal, lighting and acoustic conditions found that satisfaction of one or more aspects did not necessarily lead to overall satisfaction, and similarly dissatisfaction of one or more aspects did not lead to overall dissatisfaction. Applying this notion to the current research, it could be suggested householders who are experiencing thermal discomfort may still be comfortable through the other aspects which they associate with their comfort experience. So to revisit the way in which thermal comfort is typically approached, by assuming householders are thermally comfortable by using heat balance equations and by calculating the predicted mean vote, this approach does not adequately reflect the complex relationship between the environment and householders choices and the subsequent behaviours that work together as part of the quest of achieving comfort (Parsons 2003; Vadodaria et al. 2010).
Currently research of the residential energy user has followed a divide and control approach which has proven to have limitations, for example understanding the rebound effect which occurs from the implementation of energy efficient technologies through the perspectives of economists or engineers has failed to capture householders’ attitudes towards thermal comfort (Greening et al. 2000; Hens et al. 2010; Hertwich 2005). An interdisciplinary approach could offer an understanding of why the phenomenon occurs and contribute towards the development of effective energy policies. The findings of this research encourage a more holistic approach towards comfort and energy research, in order to understand how energy is used you have to understand the wider and complex system in which it is encased (Moezzi & Lutzenhiser 2010). This research has explored comfort from a holistic approach which has clearly shown the multi-dimensional and cross-disciplinary nature of the topic. The energy used to create comfort has not been identified by this research; however it is clear there are several aspects which consume high levels of energy; but fundamentally several ways in which householders create comfort which are not energy-intensive such as changing clothes, through personalisation of their environment or utilising energy from the sun by moving around the home to achieve warmth.

10.4 Reflections

This research followed key principles of user-centred design approach. Throughout this research comfort was explored with householders at all stage of the process; this approach gained a valuable understanding of how householders’ experience comfort within their everyday lives and insights into the various aspects which contribute to the overall experience. At each study focused on comfort within the home context, and in particular how the home environment enables various different comfort experiences to be achieved. A majority of the data collection process took place within participants’ home, this ensured the context of the phenomenon was always connected (Elwood & Martin 2000; Herzog 2005). The key principles of an interpretive phenomenological approach were also followed. The research process incorporated extensive interactions between
participants and researcher in the co-creation of an interpretation of the multidimensional comfort experience. An interpretive phenomenological approach has not only established multiple dimensions of comfort in the home, but through the interaction with householder’s has also shown how varied their individual understanding and experience of comfort can be based on their interpretation of their world and the value and significance they place on the things within them. Interpretive phenomenology also ensured the researcher’s voice was heard, this aided in the credibility of the findings.

The purpose of this research was to explore comfort holistically and to understand domestic comfort from the perspective of those living the experience. This is not a typical approach to the way a majority of current research into domestic comfort is conducted; where one or two aspects of comfort are studied in isolation rather than within the wider context with the aim of generalising and predicting human responses. This research aim to explore human experience of the phenomenon which is why blending a user-centred approach and an interpretive phenomenological approach was most beneficial. Whilst the user-centred approach ensured a focus on the householder throughout the research process, the interpretive phenomenological approach allowed the depths of this multidimensional phenomenon to be explored and an shared interpretation to be formed.
Chapter 1: Introduction

Chapter 2: Literature Review

Chapter 3: Research Paradigm

Chapter 4: Methodology

Chapter 5: Exploring Householders’ Perspective of Comfort in the Home

Chapter 6: Household Profiles

Chapter 7: Insights into Comfort and Daily Routines

Chapter 8: Exploring Psychological Dimensions of Comfort in the Home

Chapter 9: Capturing Comfort in Context

Chapter 10: Discussion: A Classification of Domestic Comfort

Chapter 11: Conclusions and Future Work

Chapter 12: References

Chapter 13: Appendices
11 Conclusions and Future Work

11.1 Conclusions

The research detailed within the thesis was conducted in response to the following issues:

- Climate change and the growing need to reduce energy use within the domestic sector.
- Space heating accounting for approximately 60% of energy use in UK dwellings (Boardman et al. 2005).
- A lack of understanding of how comfort is created in the home.
- A need for a classification of domestic comfort.

The research set out to explore and identify the multiple dimensions of domestic comfort, and to generate a classification of domestic comfort; this has successfully been achieved. The following section will set out how each objective was met.

11.1.1 Objective 1

Identify the multiple dimensions of comfort through an extensive review of the literature in the context of the domestic environment.

- Thermal comfort dominates current domestic comfort research: Due to the current pressures to reduce carbon emissions in the domestic sector and with space heating being responsible for majority of energy consumed, the literature is dominated by the energy demand-intensive aspects of thermal comfort, namely cooling and warming.
- Comfort is recognised to be more than the physiological aspects: Although thermal comfort dominates residential and non-residential comfort, it is acknowledged that social and psychological aspects also play a role in the creation of comfort, however these tend to be unexplored in the literature due to the subjective nature.
11.1.2 Objective 2

Explore the range of dimensions of comfort in the home from the perspectives of householders in a sample of UK homes.

Chapter 7 presents an exploratory study conducted through semi-structured interviews with householders’ to answer the following research question:

1) What are householders’ perceptions of the meaning of comfort in the home and how do they create their own comfort?

The findings identified several aspects associated with comfort, from which the following conclusions were found:

- Comfort is achieved in multiple ways: Householders identified various ways in which they were able to create comfort in their homes. These were found to relate to four main themes namely environmental and physical comfort, aesthetics and perception of space and order, psychological wellbeing and interactions and activities.

- Comfort is more than just thermal: the literature surrounding residential comfort is dominated by thermal comfort. Householders attributed thermal comfort to the personal meaning and creation of comfort; but various other aspects across the four themes were also identified as significant to householders’ comfort.

- The dimensions of comfort are interlinked: Householders discussed the various aspects of comfort as contributing factors towards creating an overall comfort experience.

11.1.3 Objective 3

Investigate the key psychological dimensions of comfort from the perspective of householders.

The key psychological dimensions were investigated through an exploration of the four dimensions outlined by Heijs and Stringer (1987), these were perceptual,
facilitative, personalisation and interactive comfort. The following research questions were posed:

2) **What are the psychological factors which frame comfort and how is the home environment used to create them?**

3) **Heijs and Stringer (1987) identified four psychological dimensions of comfort; can an exploration of these factors in modern UK households provide a greater understanding of how (holistic) comfort is experienced**

Through an initial sensitisation study (chapter 7) and by conducting a photo elicitation study (chapter 8), the key psychological dimensions were identified and the following conclusions were made:

- The key psychological dimensions of comfort are perceptual, interactive, personalisation and facilitative comfort: householders were able to identify the four dimensions through the guidelines they were provided with. Householders were able to discuss how significant different areas of their home were to comfort and how they were used to create various comfortable and unwinding experiences.

- Heijs and Stringer four psychological dimensions are relevant in modern UK households: The four dimensions which were devised in 1987 were discussed and found to be relevant to the overall experience of comfort achieved by householders. Participants were able to identify elements which are not typically associated with a traditional notion of comfort (i.e. thermal comfort) and provide examples of how these contributed to achieving a comfort home environment.

- The four psychological dimensions are intertwined: In investigating each dimensions individually householders also noted factors which were attributed to other dimensions, showing the interlinked nature of the psychological dimensions of comfort.
11.1.4 Objective 4

**Determine when comfort making takes place at home in the everyday lives of householders'**.

This objective was addressed through observing householders at home, specifically after work. The following research question was asked:

4) *Can comfort making activities be identified from householders’ after work routines?*

The findings were drawn from three studies; an initial sensitisation study presented in chapter 7 which sought to identify the unwinding and comfort making activities of householders', further unwinding activities were identified through the photo elicitation study presented in chapter 8 and routines were captured through conducting an ethnographic study using two self-reporting observational tools which captured householders unwinding after work in chapter 9. The following conclusions were made:

- Unwinding and comfort making activities can be identified within householder’s everyday lives: Householders’ identified longer periods of unwinding towards the end of the evening, once necessary tasks had been completed. Necessary tasks were seen as obstacles and barriers to achieving comfort, and therefore took precedence over unwinding or getting comfortable.

- Comfort making activities after work were routine: Although householders identified various ways they create comfort, after work routines were not particular varied from day to day and similar comfort activities were captured each day.
11.1.5 Objective 5

Examine different self-reporting data collection tools for exploring comfort making activities in the context of the home environment.

This objective was achieved through the use of two self-reporting data collection tools which were SenseCams and self-completion diaries. The following research question was posed:

5) Can self-reporting methods be used to capture householders routines and specifically comfort making activities?

After an initial study to identify comfort and unwinding activities of householders (chapter 7) and an ethnographic study utilising both self-reporting observational tools (chapter 9), the following conclusions were made:

- Automated self-reporting tools (the SenseCam) capture more observable details than self-completion observation tools (diaries): SenseCams offered far more details across several observable dimensions than the diaries. The diaries relied on householders and as a result details were irregular across the data set. The SenseCams were able to capture the individual actions and objects with which householders interacted with throughout their routines. Through the recollection interviews, householders were able to offer further details on their routines as the visual cues evoked householders to remember specific details about the day in question.

- SenseCams are a powerful observational tool suitable for studying the home context: the SenseCam provided accurate, time-stamped, point of view images of householders’ activities. The tools should always be used alongside a recollection interview to ensure data is interpreted correctly. The tool is engaging for participant and observer, the participant interested in viewing the images and the visual cues aided with gaining further insights into the everyday routines. For the observer, this was an immersive tool providing them with a personal and unobtrusive view into the real world of the householder. Although the reliability of the cameras was questionable at point where technical issues were experienced during the data collection
process, providing guidelines for participants’ ensured minimal impact to the data collected.

11.1.6 Objective 6

Develop a holistic classification of domestic comfort based on the literature and findings from the research

This objective was addressed in the discussion chapter; it drew upon the findings of all four studies and the literature, to develop categories of domestic comfort, the following conclusions are made in relation to the classification and the overall conclusions of this research:

- The home environment holds unique comfort parameters: comfort is researched in various different environments (vehicles, work environment, aircrafts, etc.) but the home environment holds unique qualities of freedom of action, control and security. These parameters allow householders to create a living space in line with their personal notion of comfort.

- Comfort is a collective multi-dimensional experience: householders achieve comfort as a result of a collective number of aspects, afforded by the environmental conditions and the choices that shape their behaviours and activities. These dimensions are complex, intertwined and how these are expressed is unique to each household, however together they provide a holistic description of how comfort is created and experienced within domestic homes.
11.2 Contributions to knowledge

The research has made the following contributions to further knowledge in the area of domestic comfort research:

11.2.1 The identification of wide scope of dimensions attributed to domestic comfort

This research has generated a wider description of comfort based on householders’ perspectives of comfort presented in chapter 5 and the exploration of the four psychological dimensions developed by Heijs and Stringer (1987) in chapter 8. The outcome of this research illustrates that comfort can be considered to encompass a wider number of aspects than typically considered in domestic research. Dimensions are collectively significant to householders seeking to create a comfortable home environment.

11.2.2 An exploration of the psychological dimensions of comfort

The psychological dimensions of comfort have been extensively researched through chapter 8. Through the four dimensions of comfort defined by Heijs and Stringer (1987) it was discovered perceptual, facilitative, personalisation and interactive aspects were all identifiable within the contemporary home environment and contribute to a wider definition of comfort.

11.2.3 Generating a classification of domestic comfort

This classification of domestic comfort has provided a multifaceted representation of comfort as discovered through this research. The facets identified are representative of a small sample of UK households and provide a categorisation of the dimensions identified as significant to domestic comfort.

11.2.4 Research Publications

As a result of this research, the following paper has been published:
11.3 Limitations to Research

The research applied various qualitative techniques and tools to explore the multifaceted nature of comfort, it was shaped by what was significant to the overall research aims, however it was also limited by what was possible for the research.

11.3.1 Time and Resources

The topic was explored within the time constraints of PhD research which needed to be taken into consideration when designing the studies and in sample sizes. The sample size were kept small due to the in-depth analysis conducted, the data had to be manageable within the time and resource limitations.

Time constraints also played a role within the studies. Data was collected for studies 3 and 4 simultaneously with the same sample, for the participants it was significant not to overwhelm them with the data collection process. For the researcher it was significant to keep data collection focused on the overall research aims to collect what was necessary to achieve them.

With greater resources and more time a larger samples size could have been used which would have provided a better representation of households in the UK.

11.4 Future Work

This research has conducted an in-depth exploration of domestic comfort in UK homes. The findings have contributed knowledge in the area of domestic research and could be further applied to further understanding of domestic energy use.
11.4.1 Identifying Negotiable Factors of Comfort

The research has identified the multifaceted and intertwined nature of domestic comfort. Further research could be conducted to explore in more depth the impact of each of the dimensions identified to householders overall experience of comfort. Examining the impact of all the contributing factors on householder overall comfort could potentially identify how significant thermal comfort truly is to the overall comfort experienced at home. Opportunities to save energy through for example reducing room temperature whilst maintain or enhancing other aspects of comfort could be actively explored.

This research was conducted with home owners as it was considered they would have the most freedom to created comfort in their homes. Further research could explore whether the comfort making activities and comfort experiences identified within this research also apply to those living in rented properties. Similarly how is comfort experienced in social housing? How does the meaning and creation of comfort change across various socio-cultural boundaries? Exploring these variations could help to identify negotiable factors of comfort.

11.4.2 Working Tool

This research supports an interdisciplinary approach to exploring domestic comfort and energy use, and has generated a holistic classification of domestic comfort. However in practice conducting cross-disciplinary research can be challenging, each discipline focuses on understanding a specific area of comfort from their perspective without necessarily appreciating the bigger picture. The findings of this research have determined comfort is a multi-faceted notion; the complexity of comfort can be lost with the isolation of individual factors. Therefore a holistic framework of comfort could be developed from this research to aid in cross-disciplinary research in the field. The framework could present the contributions of each discipline as well as identify differences in approaches to the comfort itself.
Chapter 1: Introduction

Chapter 2: Literature Review

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Chapter 11: Conclusions and Future Work

Chapter 12: References

Chapter 13: Appendices
References


APPENDIX A

INFORMATION SHEET

(Studies 2, 3 and 4)
EXPLORING HOW PEOPLE MAKE THEMSELVES COMFORTABLE AT HOME
Participant Information Sheet

What is the purpose of the study?

The purpose of this study is to explore the routines of householders after work in order to gain a greater understanding of how people create comfort in their homes. Comfort means so many different things to different people; some may feel sitting down and watching television is comfort whilst others may feel it’s having time to do hobbies. However one thing remains the same, we take it for granted that we can create a comfortable environment at home, but with the increasing cost of energy bills, consumers may need to rethink how they create comfort in their homes.

What will I be asked to do?
Participants will take part in an introductory focus group session and you will be given a record book to complete, which you will fill out during the week following group session; finally I will visit you at your home for an interview to discuss your routines. As part of the record book and recording your coming home from work practices; you may be asked to wear a SenseCam, this is a wearable camera which takes a photo every 20 seconds aiding with the recollection of your activities later.

First step: Introductory focus group
What will you do? You will need to attend one of the focus group sessions with other participants where we will discuss different areas of home life and routine.
Where? You will be given details of the session venue if you wish to take part; it is likely to be local.
How long will this take? 1 hour.

Second step: Record Book, Sense Cam and Data Logger
What will you do? At the focus group you will be given a record book and data logger. The record book has been designed to capture everyday home life, one section requires you to use a camera and photograph areas of your home where you where you complete certain tasks (if you don’t have a camera, then please let me know and I will see what I can do). The data logger will record the temperature, humidity and light levels in a room in your home; it is simple to use and instructions will be given in the focus group. If you are asked to use the Sense Cam then you will need to wear this for one evening.
How long will this take? The book should take no more than 1 hour in total to complete, with activities to be completed over a week period.
Third step: At-Home Interview

What will you do? I will interview you at your home where we will discuss the photo album and aspects of your routine detailed in your record book.

How long will this take? No more than 1 hour.

What do I get for participating?
You will receive a £30 gift voucher which can be used at a choice of stores (including Debenhams, Waterstones and Homebase) which you will receive after you have completed all stages of the study.

Are there any exclusion criteria?
For this study participants will need to be:
- Aged between 21 - 65 years old
- Home owner
- Work 25+ hours (and work from home no more than two days a week)
- Only one person can take part per household.

How long will it take?
This study should take no more than 3 hours in total, spread over a maximum of three weeks.

Will my taking part in this study be kept confidential and what will happen to the results of the study?
All data will be kept confidential and in a secure place. All video and audio recordings will be destroyed after six years, and no personal information will be released to third parties. Results from the study will be published as part of a doctoral thesis as well as in conference and journal papers, but no individual will be identifiable.

I have some more questions who should I contact?
Please feel free to email or call if you have any questions or you would like to take part in the study:

Main Investigator: Andrea Burris
Email: a.n.burris@lboro.ac.uk
Contact number: 07779291233
Work contact number: 01509 223588

Address:
Loughborough Design School
Loughborough University
Leicestershire
LE11 3TU
What if I am not happy with how the research was conducted?

The University has a policy relating to Research Misconduct and Whistle Blowing which is available online at
http://www.lboro.ac.uk/admin/committees/ethical/Whistleblowing(2).htm
APPENDIX B

CONSENT FORM

(Studies 2, 3 and 4)
INFORMED CONSENT FORM

(to be completed after Participant Information Sheet has been read)

The purpose and details of this study have been explained to me. I understand that this study is designed to further scientific knowledge and that all procedures have been approved by the Loughborough University Ethical Advisory Committee.

I have read and understood the information sheet and this consent form.

I have had an opportunity to ask questions about my participation.

I understand that I am under no obligation to take part in the study.

I understand that I have the right to withdraw from this study at any stage for any reason, and that I will not be required to explain my reasons for withdrawing.

I understand that all the information I provide will be treated in strict confidence and will be kept anonymous and confidential to the researchers unless (under the statutory obligations of the agencies which the researchers are working with), it is judged that confidentiality will have to be breached for the safety of the participant or others.

I agree to participate in this study.

Your name

______________________________

Your signature

______________________________

Signature of investigator

______________________________

Date

______________________________
APPENDIX C

STUDY 2: FOCUS GROUP QUESTIONS
Focus Group Questions

[Briefing for tools for studies 3 and 4]

1. How do you get comfortable?
2. Is there anything that prevents you from getting comfortable?
3. How important is unwinding to you, in your schedule?
4. What time do you generally get to unwind?
5. Does the commute home help you to transition from work and begin to unwind?

[Day-in-the-Life Exercise]
APPENDIX D

NEW ECOLOGICAL PARADIGM (NEP) SCALE
The Environment

Do you agree or disagree that (please tick accordingly)

1. We are approaching the limit of the number of people the earth can support.

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2. Humans have the right to modify the natural environment to suit their needs.

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3. When humans interfere with nature it often produces disastrous consequences.

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4. Human ingenuity will insure that we do NOT make the earth unliveable.

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5. Humans are severely abusing the environment.

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6. The earth has plenty of natural resources if we just learn how to develop them.

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7. Plants and animals have as much right as humans to exist.

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8. The balance of nature is strong enough to cope with the impacts of modern industrial nations.

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9. Despite our special abilities humans are still subject to the laws of nature.

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<thead>
<tr>
<th>Strongly Disagree</th>
<th>Mildly Disagree</th>
<th>Unsure</th>
<th>Mildly Agree</th>
<th>Strongly Agree</th>
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10. The so-called “ecological crisis” facing humankind has been greatly exaggerated.

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<tr>
<th>Strongly Disagree</th>
<th>Mildly Disagree</th>
<th>Unsure</th>
<th>Mildly Agree</th>
<th>Strongly Agree</th>
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11. The earth is like a spaceship with very limited room and resources.

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<thead>
<tr>
<th>Strongly Disagree</th>
<th>Mildly Disagree</th>
<th>Unsure</th>
<th>Mildly Agree</th>
<th>Strongly Agree</th>
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</table>
12. Humans were meant to rule over the rest of nature.

13. The balance of nature is very delicate and easily upset.

14. Humans will eventually learn enough about how nature works to be able to control it.

15. If things continue on their present course, we will soon experience a major ecological catastrophe.
APPENDIX E

STUDY 3: PHOTO ELICITATION INTERVIEW QUESTIONS
Photo Album Study

1. Of the questions I asked in the photo album section, did you find any questions particularly difficult to find examples of in your home?

2. What hinders (negatively impacts) your experience of comfort?

3. Do you feel you make full use of your home and space available?

4. What are the major constraints for you and your family which prevent you having a completely comfortable home?

5. Are you happy in your home?

6. Is there any qualities you would like your home to have, or anything you would like to be able to do?
APPENDIX F

STUDY3 AND 4: RECORD BOOK
Welcome!

Thank you for taking part in this study, your help is appreciated and I hope you will enjoy this experience too.

In this book you will find various sections, some of these sections can be filled out immediately; others will need to be completed after you return home from work. I would like you to fill this as soon as possible, after which I will collect it, go through it and arrange a time to do an interview with you.

You will already have been given a data logger to place in you’re the room you are in the most after work; this will record the temperature, humidity and light levels of the room.

You will need to use your own digital camera if you have not requested one from me; you will need this to complete the section entitled ‘Photo Album’ page 19 of this book.

Please read the instructions at the beginning of each section carefully before completion. If you do not understand anything please don’t hesitate to contact me (contact details are on page 3).

Thanks again for taking part, I’ll see you soon.

Main Investigator

Andrea Burris
Table of Contents

Contact Details .................................................................................................................. 3
Plan of Activities ................................................................................................................. 4
List of Equipment and Materials Required ........................................................................ 5
Home and Work Life .......................................................................................................... 6
SenseCam .............................................................................................................................. 9
Daily Routines .................................................................................................................. 12
Photo Album .................................................................................................................... 19
Contact Details

If you have any question or queries please contact me using the details below: **Andrea Burris**

Primary Phone No.: 07779291233

Secondary Phone No.: 01509 223588

Email address: [a.n.burris@lboro.ac.uk](mailto:a.n.burris@lboro.ac.uk)

Address;
Loughborough Design School
Loughborough University
Loughborough
Leicestershire
LE11 3TU
Plan of Activities

**Focus Group** - You will attend a focus group session with other participants where we will have a fairly informal discussion about different areas of home life and routines.

**Placing the data loggers and completing the record book** - You will be given a data logger and record book at the focus group, the data logger is simple you just need to place it in your living room. The record book will have various parts which you will need to fill in over the next few weeks.

**What you will need:**
- Digital Camera
- Data Logger
- Record Book

**Using the SenseCam** - Use the SenseCam on your return from work. You may need to wait for one of the SenseCam cameras to be available for use. I will let you know via email. (See page 9).

**What you will need:**
- SenseCam

**Completed record book, photos and data logger** - I will need the record book the data logger and your photos in the format you choose to give them to me (see page 20).

**What I will need:**
- Digital Camera (or memory stick)
- Completed Record Book
- Data Logger

**Home Interview** - I will interview you at your home where we will discuss the record book and aspects of your routine.
List of Equipment and Materials Required

Things you will need during the study...............

➢ **Record Book**

You will need to fill this in following the focus group; some parts can be filled in straight away others will need to be completed once you have return from a day’s work. I will contact you to make arrangements with you to collect the record book.

➢ **Digital Camera**

You will need to use your own digital camera if you have one or you can request one from me.

➢ **SenseCam**

You will need to wear the SenseCam Camera for one day. As there are only two cameras, you will be contacted by me as to when a camera becomes available.

➢ **Data Logger**

This will need to be placed in the room you are in the most after work. It will collect information on temperature, humidity and light levels (information is collected through sensors; it doesn’t have a camera and doesn’t monitor sound).

*Please fill in details below when you place the data logger in your home and when you remove it:*

<table>
<thead>
<tr>
<th>Data Logger</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start Date:</td>
</tr>
<tr>
<td>Start Time:</td>
</tr>
<tr>
<td>Where is it? (e.g. – on the bookshelf in the living room):</td>
</tr>
<tr>
<td>Finish Date:</td>
</tr>
<tr>
<td>Finish Time:</td>
</tr>
</tbody>
</table>
Home and Work Life

The following questions are about you, your home and your work life. Please answer as honestly as possible there are no wrong answers with any of these questions. I am simply interested in your daily life and routines.

Some questions are personal but be aware all data will be kept confidential and will be destroyed after six years.

Please tick the boxes and write in the spaces provided.

About You and Your Home

1. Please give your date of birth:
   
   [ ] D [ ] D [ ] M [ ] M [ ] Y [ ] Y [ ] Y [ ] Y

2. What is your gender?
   
   [ ] Male  [ ] Female

3. What is your marital status?
   
   [ ] Single  [ ] Widowed
   [ ] Married/ Civil Partnership  [ ] Divorced
   [ ] Separated  [ ] Unmarried and living with partner

4. How many people live at your property?

   …………. Adults (over 18 years old)
   …………. Children (under 18 years old)

5. Please indicate the approximate household income; we only need an estimate to see whether it affects participant's attitudes and behaviour. Give a total income of all members of your household:

   [ ] Less than £15,000  [ ] £15,001 - £30,000
   [ ] £30,001 - £50,000  [ ] £50,001 - £70,000
   [ ] More than £70,001

6. What type of property do you live in?

   [ ] Mid-Terraced  [ ] Bungalow
   [ ] End-Terraced  [ ] Flat
   [ ] Semi-detached  [ ] Maisonette
7. How long have you lived at the property?

............... years

About Your Occupation

1. What is your occupation? (Please tick the box you feel best describes your main job role)

☐ Managers and Senior Officials (i.e. – Director, Chief Executives)
☐ Professional Occupations (i.e.- Lawyer, Teacher)
☐ Associate Professional and Technical Occupations (i.e.- Social Worker, Police)
☐ Administrative and Secretarial Occupations (i.e.- Clerical Officer, Administrator)
☐ Skilled Trades Occupations (i.e.- plumber, farmer)
☐ Personal Service Occupations (i.e.- Nurse, Child Career)
☐ Sales and Customer Service Occupations (i.e.- Sales Assistant, Customer Advisor)
☐ Process, Plant, Machine Operatives (i.e.- Machine Operative, Lorry Driver)
☐ Elementary Occupations (i.e.- Postman, Cleaner, Security)
☐ Other or Unsure: (please give your job title)

2. How do you travel home from work? (Please tick all that apply)

☐ Walk
☐ Bus/Coach
☐ Tram
☐ Train (Over-ground)
☐ Underground
☐ Bicycle
☐ Car (as a driver)
☐ Car-share or lift (as a passenger)
☐ Other: (please specify)
3. Approximately how long is your journey home from work?

......... Hours .......... Minutes

4. The following statements are about **doing work at home after work**; please mark the one which is most like you?

☐ I almost always take work home to do.

☐ Although I could, I never take work home with me.

☐ I sometimes take work home with me.

☐ Not applicable - I cannot take work home with me.

☐ I rarely take work home with me.

5. The following statements are about transitioning from work to home, please indicate the one which best describe you **when you are at home after work**?

☐ I always find myself thinking of about work when I’m at home.

☐ I sometimes find myself thinking about work when I’m at home.

☐ I rarely think about work when I’m at home.

☐ I leave work at work, I don’t think about it when I’m at home.

**Instructions for Using the Sense Cam**

Below are instructions for using the Sense Cam, the camera should be worn around the neck for **one evening**, from when you get home from work to when you go to bed. The daily routine section should still be filled in for two days after work.

**About the SenseCam**

The SenseCam (also referred to as the Vicon Revue) is a small wearable camera that automatically takes photographs at 20 seconds intervals. The camera has a wide-angled lens that captures almost everything in front of the camera (see figure 1). The camera does not record sound, it only takes photos.
Before you start using the camera

Make sure all members of your household are aware that you are taking part in the study and will be wearing this camera which may capture photographs of them. All photographs will be kept confidential and will only be viewed by you, myself and my supervisors; and it will be possible for you to have access to the photos beforehand if you are apprehensive. No images will be used in published documents without seeking your permission beforehand.

Getting Started

- Firstly, remove the lens cover.

- To switch the camera on hold the on-off button for several seconds until you hear a rising tone and the amber light comes on (see figure 2). You don’t need to do anything else the camera will automatically start taking photos.

- Make sure you are wearing the camera correctly, it should be

Figure 2: The SenseCam showing buttons and lights
placed high on the chest and facing outwards; use the adjustable straps if necessary. Be careful that the camera is not obscured by clothing, hair, etc. See figure 3 for correct positioning.

- When photos are being taken the **green light** should remain on the entire time and the **amber light** will flash when the camera is taking a photo.
- If you need privacy, please remove the camera and place it out of the way, remember to put the camera back on afterwards (i.e. place the camera on the outside bathroom door handle). DO NOT use the privacy button as this can lead to the device malfunctioning.

### Turning the SenseCam Off

- When you are about to go to bed press the **on-off button** again until you hear a **falling tone** this indicates the camera is turning off, please replace the lens cover and put the camera in the box. Email me to let me know you have finished with the camera (a.n.burris@lboro.ac.uk).

### Any Problems

- Reset the SenseCam – If something goes wrong, such as the **amber light** does not flash over the space of 30 seconds; then reset the camera by pressing the **on-off button** and the **privacy button**
simultaneously (See figure 4). Follow by turning the camera back on by holding the on-off button for several seconds.

- Recharging the SenseCam – If the red light is on and resetting the camera does not turn it off, then you may need to recharge the camera. The charger is in the bottom of the box; plug it into the mains, after a few minutes the green light will start flashing indicating it is charging. Once the camera is fully charged the green light will stay on continuously.

- Any further problems please contact me (see page 3 for contact details).
Daily Routines

The next pages are for you to record your daily routines from when you return home from work. You need to complete this for three days during the period you have this book (if you’re using the SenseCam then fill in two days). Please try and record as much of your activities as possible (even if it doesn’t seem very relevant or important please still record it!).

Below is an example of one of the ‘daily routine’ pages the left hand columns are for you to record the approximate time, if you forget the time, don’t worry just try and get the activities in the order they occurred. The right hand column is for your description of what activity took place (see the below example).

I would suggest rather than trying to complete this book at the end of the evening, try to fill it in at regular times during the evening, so perhaps, every half an hour go back to the book and record your activities.

Example of a Diary Entry

Date: 15/02/2012

Time you returned from work: 5.20 pm

Time you went to bed: 10.25pm

<table>
<thead>
<tr>
<th>Time From:</th>
<th>Time To:</th>
<th>Can you give a brief description of the task you completed at this time?</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.20</td>
<td>5.50</td>
<td>Got in went straight upstairs and got changed from work clothes into jogging bottoms.</td>
</tr>
<tr>
<td>5.50</td>
<td></td>
<td>Made a cup of tea</td>
</tr>
<tr>
<td>6.00</td>
<td>7.00</td>
<td>Sat down in the living room and watched the news with husband and talked about our day.</td>
</tr>
<tr>
<td>6.45</td>
<td>7.05</td>
<td>Made a phone call to my Mum</td>
</tr>
<tr>
<td>7.05</td>
<td>7.30</td>
<td>Cooked Spaghetti Bolognese for the family</td>
</tr>
<tr>
<td>7.30</td>
<td>8.15</td>
<td>Sat down and ate dinner with the family at the dining table</td>
</tr>
<tr>
<td>8.20</td>
<td></td>
<td>Washed up</td>
</tr>
<tr>
<td>9.00</td>
<td>9.15</td>
<td>Had Shower</td>
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</tbody>
</table>
Daily Routines: Day 1

Date:

Time you returned from work:

Time you went to bed:

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<tr>
<th>Time From:</th>
<th>Time To:</th>
<th>Can you give a brief description of the task you completed at this time?</th>
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</tbody>
</table>
Daily Routines: Day 2

Date:

Time you returned from work:

Time you went to bed:

<table>
<thead>
<tr>
<th>Time From:</th>
<th>Time To:</th>
<th>Can you give a brief description of the task you completed at this time?</th>
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</tbody>
</table>
Daily Routines: Day 3

Date:

Time you returned from work:

Time you went to bed:

<table>
<thead>
<tr>
<th>Time From:</th>
<th>Time To:</th>
<th>Can you give a brief description of the task you completed at this time?</th>
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For this section you will need to use your own digital camera or the camera you were provided with; the idea of the ‘Photo Album’ section is to understand the meaning of different parts of your home to you. The following section will have instructions at the top of the page on what to photograph. Once you have taken the photographs I’d like you to answer the questions which follow.

I don’t expect you to print the photographs; instructions on how you can get the photos to me are overleaf. Below is an example of the type of picture you can take and how you can answer the questions (the picture below has been added for the purpose of the example).

Example

Example Instructions: Please photograph areas or items in your home which help you get privacy from others; then answer the following questions:

<table>
<thead>
<tr>
<th>Briefly describe your photo:</th>
</tr>
</thead>
<tbody>
<tr>
<td>This is a photo of my study.</td>
</tr>
</tbody>
</table>

(Example of the type of photo you would take)

Why do you use this area or item for privacy?

My study is small, cosy and personal, I have a lot of books in there as I love to read and it’s nice to have them around me.

How does this area or item allow you to have privacy?

It is my room, so the family don’t tend to come in here. I suppose because I have the door closed most of the time that lets them know that I want some privacy.
How to get the photos to me.....

- Email - You can email the photos to me, please check your email attachment limit before attaching all the photos, if you go over your email attachment limit you are unlikely to be able to send the email. You may find you will need to send the photos as attachments to several emails (a.n.burris@lboro.ac.uk).

- USB Stick – You can transfer the photos onto a memory stick, which I will collect.

- Camera or SD Card – I would be happy to retrieve the photos from your digital camera if you do not have the time to do this yourself or you can give me the SD card from the camera.
Take photos of up to 3 areas of your home, where you have been able to personalise it to your taste.

Please photograph areas or items in your home that you have been able to personalise since you moved in; then answer the following questions:

<table>
<thead>
<tr>
<th>Describe your photo:</th>
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</table>

How have you personalised this area?

Why did you decide to personalise this area?
Take photos of up to 3 areas of your home where you have been able to personalise it to your taste.

Please photograph areas or items in your home that you have been able to personalise since you moved in; then answer the following questions:

Describe your photo:

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
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________________________________________________________________________

How have you personalised this area?

________________________________________________________________________
________________________________________________________________________
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Why did you decide to personalise this area?

________________________________________________________________________
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________________________________________________________________________
Take photos of up to 3 areas of your home, where you have been able to personalise it to your taste.

Please photograph areas or items in your home that you have been able to personalise since you moved in; then answer the following questions:

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<th>Describe your photo:</th>
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</table>

How have you personalised this area?

________________________
________________________
________________________
________________________

Why did you decide to personalise this area?

________________________
________________________
________________________
________________________
Take photos of up to 3 areas in your home where you can have privacy.

Please photograph areas or items in your home which allow you to have privacy from others; then answer the following questions:

Describe your photo:
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________

How does this area allow you to have privacy?
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________

Why do you use this area for privacy?
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
Take photos of up to 3 areas in your home where you can have privacy.

Please photograph areas or items in your home which allow you to have privacy from others; then answer the following questions:

Describe your photo:

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

How does this area allow you to have privacy?

________________________________________________________________________
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________________________________________________________________________

Why do you use this area for privacy?

________________________________________________________________________
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________________________________________________________________________
________________________________________________________________________
Take photos of up to 3 areas in your home where you can have privacy.

Please photograph areas or items in your home which allow you to have privacy from others; then answer the following questions:

Describe your photo:

____________________________________________________________________
____________________________________________________________________
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____________________________________________________________________

How does this area allow you to have privacy?

____________________________________________________________________
____________________________________________________________________
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____________________________________________________________________

Why do you use this area for privacy?

____________________________________________________________________
____________________________________________________________________
____________________________________________________________________
____________________________________________________________________
Take photos of up to 3 areas in your home where you can be social.

Please photograph areas or items of your home which help you to be social with other household members and guests; then answer the following questions:

**Describe your photo:**

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**How does this area or items allow you to be social?**

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**Why do you use this area or item to be social?**

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</table>
Take photos of up to 3 areas in your home where you can be social.

Please photograph areas or items of your home which help you to be social with other household members and guests; then answer the following questions:

Describe your photo:

How does this area or items allow you to be social?

Why do you use this area or item to be social?
Take photos of up to 3 areas in your home where you can be social.

Please photograph areas or items of your home which help you to be social with other household members and guests; then answer the following questions:

Describe your photo:

How does this area or items allow you to be social?

Why do you use this area or item to be social?
Take photos of up to 3 areas in your home where you can get comfortable.

Please photograph areas or items of your home which represent comfort to you in your home, please remember there are no wrong answers, comfort is personal to you. After which, please answer the following questions:

Describe your photo:

Can you describe how you use this area or item for comfort?

What is it about this area or item that signifies comfort to you?
Take photos of up to 3 areas in your home where you can get comfortable.

Please photograph areas or items of your home which represent comfort to you in your home, please remember there are no wrong answers, comfort is personal to you. After which, please answer the following questions:

**Describe your photo:**

____________________________________________________________________

____________________________________________________________________

____________________________________________________________________

**Can you describe how you use this area or item for comfort?**

____________________________________________________________________

____________________________________________________________________

____________________________________________________________________

**What is it about this area or item that signifies comfort to you?**

____________________________________________________________________

____________________________________________________________________

____________________________________________________________________
Take photos of up to 3 areas in your home where you can get comfortable.

Please photograph areas or items of your home which represent comfort to you in your home, please remember there are no wrong answers, comfort is personal to you. After which, please answer the following questions:

<table>
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<th>Describe your photo:</th>
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</table>

Can you describe how you use this area or item for comfort?

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What is it about this area or item that signifies comfort to you?

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</table>
Take a photo of 1 area in your home where you can carry out activities you enjoy.

Please photograph areas or items of your home which allow you to do activities you enjoy such as hobbies, and then answer the following questions:

**Describe your photo:**

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

How is this area used for the activities you enjoy?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
Take a photo of 1 area in your home where you carry out activities which are necessary.

Please photograph areas or items of your home that allow you to complete necessary activities in your home (i.e.- housework), and then answer the following questions:

Describe your photo:

__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________

How is this area used for the activities which are necessary?

__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
Take a photo of 1 area of your home where you can adapt the space.

Please photograph areas or items of your home that you can adapt, such as to create extra space or to conceal private items. Then please answer the following questions:

Describe your photo:

__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________

How do you use this area to adapt the space in your home?

__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
Comfort summaries were formed from data collected during studies 2 and 3; and used to identify the personal comfort activities for each participant in the diary routines and SenseCam data.

### Maria
- **FG** Warmth
- **FG** Sitting on the sofa (with a blanket)
- **PA** Lying in bed reading or watching TV
- **PA** Bed is warm soft and relaxing
- **PA** Watching TV and films
- **PA** Playing computer games
- **PA** Listening to music

### Eva
- **FG** Quietness
- **PA** Playing board games with family
- **PA** Reading the Bible
- **PA** Family time
- **PA** Unwinds when listening to the children’s day at school
- **PA** Doesn’t watch much TV but will watch TV with the children

### Pauline
- **FG** Comfy seating
- **FG** Warmth (in winter)
- **FG** Cool (in summer)
- **FG** Relaxing
- **FG** Craft work, scrapbooking
- **PA** Lie down and watch TV snuggle with blanket
- **PA** Scrapbooking
- **PA** Sitting in the living room
- **PA** Watching TV
- **PA** Reading in the living room
- **PA** Conservatory nice cooling lighting relaxing space

### Sarah
- **FG** Watching TV
- **FG** Seating on the sofa
- **FG** Blanket
<table>
<thead>
<tr>
<th>Name</th>
<th><strong>FG</strong></th>
<th><strong>PA</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Sade</td>
<td>Sitting Comfort</td>
<td>Watching TV</td>
</tr>
<tr>
<td></td>
<td>Heating</td>
<td>Using Laptop</td>
</tr>
<tr>
<td></td>
<td>Bathing</td>
<td></td>
</tr>
<tr>
<td>Walter</td>
<td>Blanket, sofa</td>
<td>Put feet up in front TV with blanket, can fall asleep</td>
</tr>
<tr>
<td></td>
<td>Warmth</td>
<td>Reading in bed</td>
</tr>
<tr>
<td></td>
<td>Comfortable clothing</td>
<td>DIY projects</td>
</tr>
<tr>
<td></td>
<td>Keeping doors shut</td>
<td></td>
</tr>
<tr>
<td></td>
<td>A drink (beer)</td>
<td></td>
</tr>
<tr>
<td>Kevin</td>
<td>Turning down the heating</td>
<td>Listening to music</td>
</tr>
<tr>
<td></td>
<td>Listening to music</td>
<td>Watch TV or read on the couch in the living room</td>
</tr>
<tr>
<td></td>
<td>Watching TV</td>
<td>Comfy seating in the kitchen can read, nice view of garden, have tea</td>
</tr>
<tr>
<td></td>
<td>Adds comfort to productive activities. Refers to cleaning the kitchen a pleasurable experience when combined with listening to music.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Doing something completely different like juggling or biking something physical rather than using brain power, it helps unwind and it’s a choice.</td>
<td></td>
</tr>
<tr>
<td>Mike</td>
<td>Sitting comfort – decent sofa</td>
<td>Privacy from others, computer use</td>
</tr>
<tr>
<td></td>
<td>Watching TV</td>
<td>Playing tennis</td>
</tr>
<tr>
<td></td>
<td>Privacy from others members and their TV shows</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Enjoy gardening in the summer</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sitting in the Garden</td>
<td></td>
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<tr>
<td></td>
<td>Puzzles</td>
<td></td>
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<tr>
<td>Rachael</td>
<td>Snuggly on couch</td>
<td>Being outside in the summer</td>
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<tr>
<td></td>
<td>Snuggle with cat</td>
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</tr>
<tr>
<td></td>
<td>Read in bed</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sitting comfort – decent sofa</td>
<td></td>
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<tr>
<td></td>
<td>Finding privacy or time for oneself</td>
<td></td>
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<tr>
<td></td>
<td>Baths</td>
<td></td>
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<tr>
<td></td>
<td>Being outside in the summer</td>
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<tr>
<td>Rachael</td>
<td></td>
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<td>-------------------</td>
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</tr>
<tr>
<td>PA</td>
<td>Lie or snuggling on couch watching TV or read in living room</td>
<td></td>
</tr>
<tr>
<td>PA</td>
<td>Comfy seating</td>
<td></td>
</tr>
<tr>
<td>PA</td>
<td>Using laptop</td>
<td></td>
</tr>
<tr>
<td>PA</td>
<td>Lie or sit in bed</td>
<td></td>
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<table>
<thead>
<tr>
<th>Lewis</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>FG</td>
<td>Privacy from others</td>
</tr>
<tr>
<td>FG</td>
<td>Listening to music</td>
</tr>
<tr>
<td>FG</td>
<td>Watching TV (especially football)</td>
</tr>
<tr>
<td>FG</td>
<td>Lying on bed</td>
</tr>
<tr>
<td>FG</td>
<td>Watching TV (online)</td>
</tr>
<tr>
<td>FG</td>
<td>Playing the guitar</td>
</tr>
<tr>
<td>FG</td>
<td>Just to relax</td>
</tr>
<tr>
<td>FG</td>
<td>Finds washing up relaxing</td>
</tr>
<tr>
<td>FG</td>
<td>Doing something completely different such as learning a new language</td>
</tr>
<tr>
<td>PA</td>
<td>Comfy seating, TV, socialising in the living room</td>
</tr>
<tr>
<td>PA</td>
<td>Lie down and relax, watch TV</td>
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</tbody>
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<table>
<thead>
<tr>
<th>Jessica</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>FG</td>
<td>Cooking</td>
</tr>
<tr>
<td>FG</td>
<td>Watching catch up TV (but not that often)</td>
</tr>
<tr>
<td>PA</td>
<td>Lie down and watch TV with a blanket</td>
</tr>
<tr>
<td>PA</td>
<td>Lie on bed watching films and online TV</td>
</tr>
<tr>
<td>PA</td>
<td>Bathing</td>
</tr>
<tr>
<td>PA</td>
<td>Playing the piano</td>
</tr>
<tr>
<td>PA</td>
<td>Playing computer games</td>
</tr>
<tr>
<td>PA</td>
<td>Watching rubbish on TV helps to unwind</td>
</tr>
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<table>
<thead>
<tr>
<th>Olivia</th>
<th></th>
</tr>
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<tbody>
<tr>
<td>FG</td>
<td>Comfortable clothing</td>
</tr>
<tr>
<td>FG</td>
<td>Background noise from TV (hates quiet)</td>
</tr>
<tr>
<td>FG</td>
<td>Sitting down on the sofa</td>
</tr>
<tr>
<td>FG</td>
<td>Iron whilst watching TV</td>
</tr>
<tr>
<td>PA</td>
<td>Watching TV, films</td>
</tr>
<tr>
<td>PA</td>
<td>Snuggle on the sofa watching TV and films</td>
</tr>
<tr>
<td>PA</td>
<td>Rearrange cushions for sitting comfort</td>
</tr>
<tr>
<td>PA</td>
<td>Lie down in bed and relax</td>
</tr>
<tr>
<td>PA</td>
<td>Reading in the sun</td>
</tr>
<tr>
<td>PA</td>
<td>Eating meals in the summer outside</td>
</tr>
<tr>
<td>PA</td>
<td>Play music</td>
</tr>
<tr>
<td>PA</td>
<td>Play the piano</td>
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