The role of packaging imagery in people’s understanding of a product’s health function.

by

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ABSTRACT

Background: Can an image act as a health claim? Current EC legislation asserts that they can (EC, 2006). But how valid is this assumption? Do consumers, consciously or unconsciously, treat packaging imagery as offering informational value? Prior research on this issue largely involves direct questioning methods. The present research aims to test this assumption using both direct and indirect measures, and proposes a novel memory-based method to explore whether packaging imagery elicits health inferences without prompting, and the extent to which these inferences are made implicitly.

Method & Results: This thesis consists of seven studies. Studies 1-3 used direct measures to test the assumption that packaging imagery can act as health claims insofar as they prime people’s expectations as to a product’s health function. Studies 4-7 present a novel memory-based method to explore how packaging imagery affects people’s inferences about these health benefits.

Study 1. A computer-based laboratory experiment in which participants (n = 26) rate their belief in the health function of dietary supplement products. Data confirmed the assertion made in the legislation that images can act as health claims.

Study 2. An international online survey, conducted in three European countries (Italy, n = 145, Romania, n = 186, UK, n = 163). The data suggest that packaging imagery significantly altered participants’ belief as to the potential health benefits of consuming products.

Study 3. An online survey conducted during the period of the 2012 London Olympic Games found that the presence of Olympic branding did not significantly influence participants’ (n = 279) perceptions as to the ‘healthfulness’ of sponsors’ food and beverage products.

Study 4. A laboratory experiment which introduced a novel indirect memory-based paradigm for measuring consumer understanding. The resulting memory errors suggested that participants (n = 36) formed inferences as to the product’s health function from the packaging imagery.
Study 5. A replication of Study 4 with the addition of a forewarning to the memory-based paradigm (n = 54). Data suggested that memory errors are of an implicit nature, occurring beyond participants’ conscious awareness.

Study 6. The memory-based paradigm was used to examine the combined influence of packaging imagery and text-based health claims on participants’ memory for health function (n = 46). The findings were in a similar overall direction to previous, although not significantly so.

Study 7. An international online experiment, conducted in five European countries (Germany, n = 79, Netherlands, n = 71, Slovenia, n = 71, Spain, n = 70, UK, n = 81) extended the memory-based paradigm to include a free recall task, and to investigate the influence of function image on different type of packaging claim. Data indicated the effect to be replicated with free recall, and that the presence of a function image creates a false recollection of having previously seen a health claim.

Conclusion: Together, the results of these studies lend good support for the notion that function images can indeed lead people to infer health properties of products. The presence of these images can alter people’s belief in the health benefits of products, and lead them to falsely recognise health claims that they have not truly read in text. These inferences appear to often be implicit and occur without prompting.

Keywords: health claims, imagery, inferences, memory, recognition errors.
DECLARATION OF ORIGINALITY

This thesis and the work to which it refers are the results of my own efforts. Any ideas, data, images or text resulting from the work of others (whether published or unpublished) are fully identified as such within the work and attribute to their originator in the text, bibliography or in footnotes. This thesis has not been submitted in whole or in part for any other academic degree or professional qualification. I agree that the University has the right to submit my work to the plagiarism detection service TurnitinUK® for originality checks. Whether or not drafts have been so assessed, the University reserves the right to request an electronic version of the final document (as submitted) for assessment as above.

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FULL DISCLOSURE OF INTERESTS

The research in this thesis was supported in part by funding from the European Commission’s Seventh Framework Programme. Specifically, Study 2 was supported by funds from the Plant LIBRA (Plant food supplements: Levels of intake, Benefit and Risk Assessment) project, and Study 7 was supported by funds from CLYMBOL (Role of Health-Related Claims and Symbols in Consumer Behaviour) project.

The following publication Studies 4, 5 and 7 have been published in the following paper;


In addition, travel funds received from both projects facilitated the presentation of Studies 1, 2, 4, 5, 6 and 7 at the following academic conferences and project meetings.


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# TABLE OF CONTENTS

Abstract ........................................................................................................ ii
Declaration of Originality ........................................................................ iv
Full disclosure of Interest ......................................................................... v
Acknowledgements ................................................................................... vii
Table of Contents ...................................................................................... viii
List of Figures ............................................................................................ xi
List of Tables .............................................................................................. xiv

## CHAPTER 1

Literature Review ........................................................................................ 1

**Part One: Defining Health Claims** ........................................................... 1

1.1.1 Chapter Overview ........................................................................... 1
1.1.2 Legislating Health Claims .............................................................. 2
1.1.3 What is a Health Claim? The Legal Definition ......................... 2
1.1.4 Consumer Perception of Health Claims ..................................... 4
1.1.5 Images as Health Claims ............................................................... 6
1.1.6 Section Summary ........................................................................... 11

**Part Two: Models and Theories** ............................................................ 12

1.2.1 Product Packaging as a Means of Communicating with the
    Consumer ............................................................................................ 12
1.2.2 Beliefs and Attitudes .................................................................... 13
1.2.3 Dual – Process Theories ............................................................... 15
1.2.4 Elaboration Likelihood Model (ELM) ........................................... 16
1.2.5 Heuristic – Systematic Model of Information Processing
    (HSM) ............................................................................................... 18
1.2.6 Source Monitoring Framework (SMF) ........................................ 20
1.2.7 Heuristic Processing .................................................................... 23
1.2.8 Schemas ....................................................................................... 23
1.2.9 Processing Fluency ....................................................................... 26
1.2.10 Section Summary ........................................................................ 30
Part Three: Measures of Understanding................................. 31
  1.3.1 Direct and Indirect Measures of Consumer Understanding...... 31
  1.3.2 Direct Measures.................................................. 31
  1.3.3 Limitations of Direct Measures.................................. 33
  1.3.4 Indirect Measures.................................................. 34
  1.3.5 The Implicit Association Test (IAT)............................ 35
  1.3.6 The Evaluative Priming Task................................... 36
  1.3.7 The Semantic Priming Task.................................... 36
  1.3.8 Evaluation of Indirect Measures................................ 36
  1.3.9 Memory as an Indirect Measure of Understanding............ 38
  1.3.10 Memory Errors................................................... 39
  1.3.11 False Memory or False Belief.................................. 41
  1.3.12 Memory Errors and Pictures.................................. 42
  1.3.13 Memory and Advertising...................................... 43
  1.3.14 Section Summary................................................ 44

Part Four: Outlining the Studies......................................... 46
  1.4.1 Rationale for Thesis............................................. 46
  1.4.2 Thesis Aims....................................................... 48
  1.4.3 Plan of Thesis..................................................... 48
  1.4.4 Studies 1-3. The role of packaging imagery on people’s beliefs
      for product’s health function...................................... 49
      1.4.4.1 Study 1...................................................... 49
      1.4.4.2 Study 2...................................................... 49
      1.4.4.3 Study 3...................................................... 49
  1.4.5 Studies 4-7. The role of packaging imagery on people’s memory
      for product’s health function...................................... 50
      1.4.5.1 Study 4...................................................... 50
      1.4.5.2 Study 5...................................................... 51
      1.4.5.3 Study 6...................................................... 51
      1.4.5.4 Study 7...................................................... 51
  1.4.6 Section Summary................................................ 52
CHAPTER 2

Study 1. Investigating the Effects of Function Images on People’s Beliefs About the Health Claims of Dietary Supplements

2.1 Chapter Overview
2.2 Introduction
2.3 Aims

METHOD

2.4 Participants
2.5 Design
2.6 Materials

2.6.1 Dietary Supplement Packaging
2.6.2 Written health Claims

2.7 Procedure
2.8 Ethics

RESULTS

2.9 Data Analysis
2.10 Mean Belief Ratings for Written Health Claims
2.11 Mean Belief Ratings Analysed by Health Category

2.11.1 Sleep
2.11.2 Memory & Cognitive Function
2.11.3 Bones & Joints
2.11.4 Heart
2.11.5 Cold & Flu
2.11.6 Women’s health

2.12 Response Times for Written Health Claims

DISCUSSION

2.13 Methodological Limitations
2.14 Conclusion

CHAPTER 3

Study 2. Packaging Imagery Influences People’s Appraisal of Product’s Health Risks and Benefits

...
3.1 Chapter Overview ......................................................... 70
3.2 Communicating risk and benefit ...................................... 70
3.3 The relationship between risk and benefit ......................... 71
3.4 Risk and Benefit Images .................................................. 74
3.5 Aims ............................................................................ 75

METHOD .......................................................... 77
3.6 Participants .................................................................... 77
3.7 Design ........................................................................ 77
3.8 Materials ................................................................. 78
   3.8.1 Supplement packaging ........................................... 78
   3.8.2 Written health claims ............................................. 79
   3.8.3 Risk/Benefit Claims ................................................ 81
3.9 Procedure ..................................................................... 81
3.10 Ethics .......................................................................... 84
3.11 Initial Data Screening ................................................... 84

RESULTS .......................................................... 85
3.12 Data Analysis .......................................................... 85
3.13 Mean Belief Ratings for Health Claims ......................... 86
   3.13.1 Critical health claims ............................................. 86
   3.13.2 Non-critical health claims ..................................... 88
   3.13.3 Comparison of mean belief ratings for critical and non-critical health claims ................................. 88
   3.13.4 Comparison of mean belief ratings by health category .......................................................... 89
3.13 Perception of the Potential Risks and Benefits of Consuming Products ........................................ 90
3.14 Relationship Between Function Image and Risk and Benefit Judgements ........................................ 92
3.15 Perception of the Ratio of Risk to Benefit ...................... 92
3.16 Qualitative Analysis of the Decision-Making Process ........ 93

DISCUSSION .......................................................... 96
3.17 Methodological Limitations ........................................... 97
3.18 Conclusion ............................................................... 100
CHAPTER 4

Study 3. The Effects of Olympic Branding on People’s Beliefs as to the
‘Healthiness’ of Sponsored Food and Drink Products…………………………. 101

4.1 Chapter Overview………………………………………………………….. 101
4.2 Introduction……………………………………………………………….. 101
4.3 Aims……………………………………………………………………………… 104

METHOD…………………………………………………………………………. 105

4.4 Participants……………………………………………………………………. 105
4.5 Design and Materials…………………………………………………………….. 105
4.5.1 Selecting product packaging………………………………………………. 106
4.6 Procedure………………………………………………………………………. 107
4.7 Initial Data Screening…………………………………………………………. 108

RESULTS…………………………………………………………………………. 110

4.7 Data Analysis…………………………………………………………………. 110
4.8 Testing for the Effects of Olympic Branding on Estimates of the
Nutritional Values of Products…………………………………………………… 110
4.9 Testing for the Effect of Participant Demographics on Estimates of
the Nutritional Values of Products…………………………………………………. 113
4.9.1 Gender……………………………………………………………………….. 113
4.9.1.1 Fat……………………………………………………………………….. 113
4.9.1.2 Sugar……………………………………………………………………. 113
4.9.1.3 Calories……………………………………………………………… 113
4.9.2 Age…………………………………………………………………………. 114
4.9.2.1 Fat………………………………………………………………………. 114
4.9.2.2 Sugar……………………………………………………………………. 114
4.9.2.3 Calories………………………………………………………………. 114
4.10 Relationship Between Olympic Branding and Health…………………. 114

DISCUSSION……………………………………………………………………. 116

4.11 Methodological Limitations…………………………………………………. 117
4.12 Conclusion……………………………………………………………………. 118
CHAPTER 5

Study 4. Investigating the Effects of Function Images on Recognition of Health Claims: A Novel Memory-based Measure

5.1 Chapter Overview

5.2 Introduction

5.3 Memory as an Indirect Method

5.4 Aims

5.5 Participants

5.6 Design

5.7 Materials

5.7.1 Dietary supplement packaging

5.7.2 Written health claims

5.7.2.1 Related Claims (non-critical claims)

5.7.2.2 Unrelated Claims (non-critical claims)

5.7.2.3 Critical Claims

5.8 Procedure

5.8.1 Encoding phase

5.8.2 Recognition phase

5.9 Ethics

5.10 Data Analysis

5.11 Recognition of Critical Claims

5.12 Recognition of Non-Critical Claims

5.13 Subjective Judgement for Critical Claims

5.14 Subjective Judgement for Non-Critical Claims

5.15 True Recognition

5.16 Methodological Limitations

5.17 Conclusions
CHAPTER 6

Study 5. Investigating the Effect of Forewarning on the Recognition of Health Claims

6.1 Chapter Overview
6.2 Introduction
6.3 Warnings and Persuasion
6.4 Warnings and Memory
6.5 Aims

METHOD

6.6 Participants
6.7 Design and Procedure
6.8 Materials
6.9 Ethics

RESULTS

6.10 Data Analysis
6.10.1 No-warning condition
6.10.2 Warning condition
6.10.3 Comparison of warning and no-warning conditions

6.11 No-Warning Condition
6.11.1 Recognition of critical claims
6.11.2 Subjective judgements for critical claims
6.11.3 Recognition of non-critical claims
6.11.4 Subjective judgements for non-critical claims
6.11.5 True Recognition

6.12 Warning Condition
6.12.1 Recognition of critical claims
6.12.2 Subjective judgements for critical claims

6.13 Comparison of Warning and No-Warning Conditions
6.13.1 Recognition of critical claims
6.13.2 Subjective judgement for critical claims
6.13.3 Recognition of non-critical claims
6.13.4 Subjective judgement for non-critical claims
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>DISCUSSION</td>
<td>151</td>
</tr>
<tr>
<td>6.13.5 True Recognition</td>
<td>150</td>
</tr>
<tr>
<td>6.14 Methodological Limitations</td>
<td>152</td>
</tr>
<tr>
<td>6.15 Conclusions</td>
<td>153</td>
</tr>
</tbody>
</table>

**CHAPTER 7**

**Study 6. Investigating the Effect of Packaging Claims and Function Images on Recognition of Health Claims**

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.1 Chapter Overview</td>
<td>154</td>
</tr>
<tr>
<td>7.2 Introduction</td>
<td>154</td>
</tr>
<tr>
<td>7.3 The Picture – Superiority Effect</td>
<td>155</td>
</tr>
<tr>
<td>7.4 Picture – Text Congruence</td>
<td>156</td>
</tr>
<tr>
<td>7.5 Health Images and Health Claims</td>
<td>156</td>
</tr>
<tr>
<td>7.6 Aims</td>
<td>157</td>
</tr>
<tr>
<td>METHODOLOGY</td>
<td>158</td>
</tr>
<tr>
<td>7.7 Participants</td>
<td>158</td>
</tr>
<tr>
<td>7.8 Design</td>
<td>158</td>
</tr>
<tr>
<td>7.9 Materials</td>
<td>158</td>
</tr>
<tr>
<td>7.9.1 Dietary supplement packaging</td>
<td>158</td>
</tr>
<tr>
<td>7.9.2 Written health claims</td>
<td>159</td>
</tr>
<tr>
<td>7.10 Procedure</td>
<td>159</td>
</tr>
<tr>
<td>7.11 Ethics</td>
<td>159</td>
</tr>
<tr>
<td>RESULTS</td>
<td>162</td>
</tr>
<tr>
<td>7.12 Data Analysis</td>
<td>162</td>
</tr>
<tr>
<td>7.13 Recognition of Critical Claims</td>
<td>162</td>
</tr>
<tr>
<td>7.14 Subjective Judgement for Critical Claims</td>
<td>164</td>
</tr>
<tr>
<td>7.14.1 Guess</td>
<td>164</td>
</tr>
<tr>
<td>7.14.2 Remember</td>
<td>164</td>
</tr>
<tr>
<td>7.14.3 Know</td>
<td>165</td>
</tr>
<tr>
<td>7.15 Recognition of Non-Critical Claims</td>
<td>165</td>
</tr>
<tr>
<td>7.16 Subjective Judgements for Non-Critical Claims</td>
<td>166</td>
</tr>
<tr>
<td>7.16.1 Guess</td>
<td>166</td>
</tr>
</tbody>
</table>
CHAPTER 8

Study 7. Investigating the Role of Health Related Claims and sYMBOLS in Consumer Understanding (CLYMBOL)................................. 171

8.1 Chapter Overview................................................. 171
8.2 Introduction....................................................... 171
8.3 Recall and Recognition........................................... 172
8.4 Types of Health Claim............................................ 173
8.5 The Average Consumer......................................... 174
8.6 Aims.................................................................. 174

METHOD....................................................................... 176

8.7 Participants............................................................ 176
8.8 Design................................................................ 176
8.9 Materials.............................................................. 176
  8.9.1 Food packaging............................................... 176
  8.9.2 Health claims on packaging.............................. 177
8.10 Procedure............................................................. 178
  8.10.1 Encoding phase.............................................. 178
  8.10.2 Free recall phase............................................ 180
  8.10.3 Recognition phase......................................... 180
8.11 Ethics.................................................................. 180
8.12 Initial Data Screening.......................................... 183
  8.12.1 Coding of recall data..................................... 183

RESULTS...................................................................... 185

8.13 Data Analysis....................................................... 185
  8.13.1 Free recall data............................................. 185
9.7 Methodological Limitations ........................................... 211
9.8 Involvement in EU 7th Framework Projects ....................... 212
9.9 Future Research ......................................................... 213
9.10 Conclusion .............................................................. 215

REFERENCES ....................................................................... 216

APPENDICES ....................................................................... 239
Appendix A. Participant consent form used in Study 1 ............... 239
Appendix B. Participant debriefing sheet from Study 1 ............... 240
Appendix C. C1. List of critical health claims used in Study 1 ...... 241
C2. List of non-critical health claims used in Study 1 ....... 242
Appendix D. Letter confirming a favourable ethical opinion from
the University of Surrey Ethics Committee for Studies 1 & 4 . . . . . 243
Appendix E. List of written health claims used in Study 2 .......... 244
Appendix F. List of risk and benefit claims used in Study 2 ........ 245
Appendix G. Letter confirming a favourable ethical opinion from
the University of Surrey Ethics Committee for Study 2 ....... 247
Appendix H. Copy of the online experiment used in Study 2 ...... 248
Appendix I. Copy of the online survey used in Study 3 ............. 258
Appendix J. Participant consent form used Study 4 .................... 262
Appendix K. Participant debriefing sheet used in Study 4 .......... 263
Appendix L. Participant instructions from Study 4 ..................... 264
Appendix M. M1. List of critical health claims used in Study 4 .... 265
M2. List of non-critical health claims used in Study 4..... 266
Appendix N. Participant consent form used in Study 5 ................ 267
Appendix O. Participant debriefing sheet used in Study 5 .......... 268
Appendix P. Onscreen instructions from Study 5 .................... 269
Appendix Q. Letter confirming a favourable ethical opinion from
the University of Surrey Ethics Committee for Study 5 ..... 270
Appendix R. Participant consent form used in Study 6 ............. 271
<table>
<thead>
<tr>
<th>Appendix</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>S</td>
<td>Participant debriefing sheet used in Study 6</td>
<td>272</td>
</tr>
<tr>
<td>T</td>
<td>List of packaging claims used in Study 6</td>
<td>273</td>
</tr>
<tr>
<td>U</td>
<td>Letter confirming a favourable ethical opinion from the University of Surrey Ethics Committee for Study 6</td>
<td>274</td>
</tr>
<tr>
<td>V</td>
<td>VI. Product’s representing the health category ‘cold and flu’</td>
<td>275</td>
</tr>
<tr>
<td></td>
<td>V2. Product’s representing the health category ‘heart function’</td>
<td>276</td>
</tr>
<tr>
<td></td>
<td>V3. Product’s representing the health category ‘bones and joints’</td>
<td>277</td>
</tr>
<tr>
<td></td>
<td>V4. Product’s representing the health category ‘memory and cognitive function’</td>
<td>278</td>
</tr>
<tr>
<td></td>
<td>V5. Product’s representing the health category ‘sleep’</td>
<td>279</td>
</tr>
<tr>
<td></td>
<td>V6. Product’s representing the health category ‘weight loss’</td>
<td>280</td>
</tr>
<tr>
<td></td>
<td>V7. Product’s representing the health category ‘women’s health’</td>
<td>281</td>
</tr>
<tr>
<td>W</td>
<td>Participant information screen from Study 7</td>
<td>282</td>
</tr>
<tr>
<td>X</td>
<td>Participant consent form from Study 7</td>
<td>283</td>
</tr>
<tr>
<td>Y</td>
<td>Participant debrief statement from Study 7</td>
<td>284</td>
</tr>
<tr>
<td>Z</td>
<td>Letter confirming a favourable ethical opinion from the University of Surrey Ethics Committee for Study 7</td>
<td>285</td>
</tr>
<tr>
<td>AA</td>
<td>Examples of carrier packaging displaying text-based claims and function images from Study 7</td>
<td>286</td>
</tr>
<tr>
<td></td>
<td>AA1. Wholegrain Bread</td>
<td>286</td>
</tr>
<tr>
<td></td>
<td>AA2. Cheddar Cheese</td>
<td>287</td>
</tr>
<tr>
<td></td>
<td>AA3. Peanuts</td>
<td>288</td>
</tr>
<tr>
<td></td>
<td>AA4. Fish Fingers</td>
<td>289</td>
</tr>
<tr>
<td></td>
<td>AA5. Porridge Oats</td>
<td>290</td>
</tr>
<tr>
<td></td>
<td>AA6. Wholegrain Pasta</td>
<td>291</td>
</tr>
<tr>
<td></td>
<td>AA7. Drinking Yogurt</td>
<td>292</td>
</tr>
<tr>
<td></td>
<td>AA8. Sports Drink</td>
<td>293</td>
</tr>
</tbody>
</table>
AA9. Natural Yogurt.................................................. 294
AA10. Cereal Bar..................................................... 295
AA11. Oat Biscuits.................................................. 296
LIST OF FIGURES

CHAPTER 2

Figure 1. Fictitious dietary supplement packaging from the ‘image-present’ condition ................................................................. 57
Figure 2. Fictitious dietary supplement packaging from the ‘image-absent’ condition ................................................................. 57
Figure 3. Screenshot illustrating the experimental procedure for Study 1 … 59
Figure 4. Mean belief ratings for congruent and incongruent claims when function images on the dietary supplement packaging are present and absent .................................................................................. 61
Figure 5. Mean belief ratings for congruent and incongruent claims when the function image on dietary supplement packaging is present and absent for the health categories .................................................. 65
Figure 6. Mean response time for congruent and incongruent claims when the function images on dietary supplement packaging are present and absent .................................................................................. 66

CHAPTER 3

Figure 7. Product packages from the image-present condition .......... 80
Figure 8. Product packages from the image-absent condition ............ 80
Figure 9a. Screenshot of the belief rating scales in the online survey used in Study 2 ............................................................................ 82
Figure 9b. Screenshot of the risk-benefit rating scales in the online survey used in Study 2 ............................................................................ 83
Figure 10. Mean belief ratings for critical claims by participants’ country of residence ........................................................................... 87
Figure 11. Mean belief ratings for non-critical claims by participants’ country of residence ........................................................................... 87
Figure 12. A comparison of mean belief ratings for critical and non-critical health claims ........................................................................... 89
Figure 13. Perception of the potential risks and benefits of consuming
<table>
<thead>
<tr>
<th>CHAPTER 4</th>
<th>Figure 14. Olympic branded and non-branded products</th>
<th>107</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHAPTER 5</td>
<td>Figure 15. Screenshot of the encoding phase task from Study 4</td>
<td>126</td>
</tr>
<tr>
<td>Figure 16. Screenshot of the recognition phase task from Study 4</td>
<td>126</td>
<td></td>
</tr>
<tr>
<td>Figure 17. Screenshot of the instructions given to participants for the metacognitive appraisal task undertaken during the recognition phase of Study 4</td>
<td>126</td>
<td></td>
</tr>
<tr>
<td>Figure 18. Diagram of the overall procedure used in Study 4</td>
<td>127</td>
<td></td>
</tr>
<tr>
<td>Figure 19. Proportion of cases in which participants falsely recognised health claims</td>
<td>130</td>
<td></td>
</tr>
<tr>
<td>CHAPTER 6</td>
<td>Figure 20. Diagram of the overall procedure used in Study 5</td>
<td>142</td>
</tr>
<tr>
<td>Figure 21. Proportion of recognition errors for critical claims by condition...</td>
<td>145</td>
<td></td>
</tr>
<tr>
<td>CHAPTER 7</td>
<td>Figure 22. Products’ representing the health category of ‘digestive function’</td>
<td>160</td>
</tr>
<tr>
<td>Figure 23. Diagram of the overall procedure used in Study 6</td>
<td>161</td>
<td></td>
</tr>
<tr>
<td>Figure 24. Proportion of cases in which participants falsely recognised packaging claims</td>
<td>163</td>
<td></td>
</tr>
<tr>
<td>CHAPTER 8</td>
<td>Figure 25. Examples of carrier packaging displaying text-based claims and a function image</td>
<td>179</td>
</tr>
<tr>
<td>Figure 26. Screenshot of the free recall task from Study 6</td>
<td>181</td>
<td></td>
</tr>
<tr>
<td>Figure 27. Screenshot of the recognition task from Study 6</td>
<td>181</td>
<td></td>
</tr>
<tr>
<td>Figure 28. Diagram of the overall procedure used in Study 6</td>
<td>182</td>
<td></td>
</tr>
<tr>
<td>Figure 29. Proportion of cases in which participants recalled claims as health claims</td>
<td>187</td>
<td></td>
</tr>
<tr>
<td>Figure 30. Proportion of cases in which participants correctly recalled claim type</td>
<td>189</td>
<td></td>
</tr>
<tr>
<td>Figure 31. Proportion of cases in which participants recognised claims as</td>
<td>189</td>
<td></td>
</tr>
</tbody>
</table>
health claims................................................................. 191
LIST OF TABLES

CHAPTER 3
Table 1. Demographic characteristics by country of residence………… 78

CHAPTER 4
Table 2. Mean estimates and actual nutritional values by product……… 113

CHAPTER 6
Table 3. Proportion of recognition errors for critical claims made by
participants in Study 5, overall and split by subjective
Remember, Know, Guess response…………………………… 147

CHAPTER 7
Table 4. Proportion of recognition errors for critical claims, split by
subjective response…………………………………………… 164

CHAPTER 8
Table 5. List of foodstuff, substances, claims, and their relationship to
health………………………………………………………… 184
Table 6. Proportion of claims correctly recalled as claim-type, overall
and split by country………………………………………… 190
Table 7. Proportion of claims recognised by participants, overall and
split by country……………………………………………… 192
CHAPTER 1
LITERATURE REVIEW
Part One: Defining Health Claims

1.1.1 Chapter Overview

As the current trend in lifestyle-related health problems and diseases looks set to grow, so does consumer interest in the relationship between food and health (World Health Organisation [WHO], 2014). Indeed, consumers are learning that the choices they make when it comes to food will ultimately impact upon their health (Food Standards Agency [FSA], 2014). For example, in a survey conducted by the FSA (2011), respondents rated a variety of factors as either very important or fairly important for a healthy lifestyle. These factors included the eating of fruits and vegetables (99% of respondents), eating less salt (94%) and limiting foods high in saturated fat (92%). Increasingly, consumers want to know what is in the food they eat and where it is from (TNS, 2013); for this they need to engage with the product and its packaging. However, “consumers know that words lie, pictures mislead and marketers tell stories” (FSA, 2010, p.5). But to what extent does this packaging information - and in particular, packaging pictures, images and symbols - actually (mis)lead or persuade consumers? For example, what should consumers infer about the health benefits of a breakfast cereal, whose packaging pictures it inside a heart-shaped bowl? Or about a new dietary supplement, whose packaging bears a symbol of a human brain? Manufacturers are increasingly marketing food products based on their health properties and using imagery as a means to communicate their message. However, little is known about the role of front-of-pack imagery in shaping consumers’ cognitions about the health properties of products. Thus the research presented in this thesis aims to use both direct and indirect methods to examine how imagery on food and dietary supplement packaging might lead consumers to – appropriately or inappropriately – infer health benefits of those products.

This thesis will commence with a review of the current literature. Part one of this literature review will examine the current legislation for the use of health and nutrition claims on food, beverage and dietary supplement packaging, including the use of images, symbols and graphics. Part two will then go on to examine how consumers might formulate beliefs and attitudinal judgements towards a product,
before moving on to explore the models and theories underpinning consumer decision-making. Finally, part three discusses the relative merits of direct and indirect measures of consumer understanding, before proposing a novel memory-based indirect measure.

1.1.2 Legislating Health Claims

From a European perspective, there have been a number of legislative developments in recent years that guide manufacturers on the exact health claims that they are – and are not – authorised to make about their products. In December 2006, the European Commission (EC) adopted a regulation that aimed to harmonise the disparate rules governing the use of health and nutrition claims across European Union (EU) member states. Regulation (EC) No 1924/2006 on nutrition and health claims made on foods was therefore created to ensure that any claim made on foods is clear, accurate and based on evidence accepted by the whole scientific community (EUROPA, 2014). The envisioned outcome of this legislation was to eliminate, from the market place, food products bearing claims that could mislead the consumer. Such legislation was deemed necessary due to the increasing number of food products and advertisements that carried health claims and as a means to ensure a high level of protection for consumers and to facilitate their choice (EUROPA, 2014).

1.1.3 What is a Health Claim? The Legal Definition

The overarching aim of the research studies set out in this thesis is to further our understanding of consumers’ use of visual health claims. It is therefore essential, to understand more fully what is meant by the term ‘health claim’ both according to the current legislation and it’s meaning for consumers.

The legal definition of a health claim - as applicable in the United Kingdom - is set out by the European Commission in Article 2 of Regulation (EC) 1924/2006. This regulation states, “A ‘claim’ means any message or representation, which is not mandatory under Community or national legislation, including pictorial, graphic or symbolic representation, in any form, which states, suggests or implies that a food has particular characteristics” (EC, 2006, Art 2.2.1). The regulation goes on to specifically define a health claim as “…any claim that states, suggests or implies that
a relationship exists between a food category, a food or one of its constituents and health” (EC, 2006, Art. 2.2.5).

There are two types of health claims applicable under this legislation: General Function Health Claims and Disease Risk Reduction Claims. General function claims under Article 13.1 of the EC 1924/2006 are those describing or referring to the role of a nutrient or other substance in (a) growth, development and the functions of the body; or (b) psychological and behavioural functions; or (c) slimming or weight control, or a reduction in the sense of hunger or an increase in the sense of satiety, or to the reduction of the available energy from the diet. An example of such a claim would be “Calcium is needed for the maintenance of normal bones”. Claims under Article 14 of EC 1924/2006 refer to the Disease Risk Reduction Claims. These claims make reference to the reduction of disease risk and other substances that may improve or modify the normal functions of the body. An example of a risk reduction claim would be “Plant sterols have been shown to reduce cholesterol levels, a risk factor in the development of coronary heart disease.” These claims differ from nutrition claims, also defined in Regulation EC 1924/2006, with nutrition claims being those that state, suggest or imply that a food has particular beneficial nutritional properties due to the energy (calorific value) it (i) provides; (ii) provides at a reduced, or increased rate; or (iii) does not provide; and/or the nutrients, or other substances it (i) contains; (ii) contains in reduced, or increased proportions; or (iii) does not contain. Some examples of nutrition claims permitted for use on food packaging would be; “Low Energy”, “Low Fat”, “Source of Vitamin C”, “Source of Zinc”, “High Protein” and “High Fibre” (EC, 2006, Art. 2.2.4).

Finally, it is important to note that food supplements are harmonised within this legislation, and thus the same rules apply to making health and nutrition claims on food supplements as on foods themselves. In this instance, food supplements- also known as ‘dietary supplements’- are defined as foodstuffs whose purpose is to supplement the normal diet and which are concentrated sources of nutrients or other substances with a nutritional or physiological effect (Directive 2002/46/EC). Such examples of food supplements, available for sale on the UK market, would be; Echinacea, Ginkgo Biloba, and Valerian Root extract. Due to this harmonisation within the regulation, the studies contained within this thesis have used both food supplement and food packaging as stimulus material.
1.1.4 Consumer Perception of Health Claims

The legislation further requires that any claim promoting the health benefits of a food be both scientifically substantiated and understandable to the ‘average consumer’. That is to say, the “use of nutrition and health claims shall only be permitted if the average consumer can be expected to understand the beneficial effects as expressed in the claim” (EC, 2006, Art. 5.2), with the average consumer being defined as one who is “reasonably well informed and reasonably observant and circumspect, taking into account social, cultural and linguistic factors” (EC, 2006, par 16). Researchers have therefore set out to investigate consumers’ understanding of health claims, and the influence of such understanding on consumers’ attitude towards the product and their intention to purchase it.

Studies suggest that consumers hold a positive attitude towards health claims (Grunert & Wills, 2007), and consider the presence of health claims on product packaging to be ‘advantageous’ (Urala, Arovla, & Lähteenmäki, 2003). Indeed, products labelled with health claims are generally perceived as ‘healthier’ than alternatives without a claim (Van Trijp & Van der Lans, 2007). A purchase simulation study, in which participants were given the opportunity to ‘buy’ actual products to take away with them after the experiment, found foods with a claim to be clearly preferred, and regarded as ‘healthier’ than alternative products without claims (Aschemann-Witzel & Hamm, 2010). One explanation for this preference towards health claims is that they assist consumers in their decision-making by helping them to sort products within a food category (e.g., breakfast cereals) based on attributes. Furthermore, it allows the consumer a means to compare the various food categories available to them (Roe, Levy & Derby, 1999). An example might be a comparison of the food categories ‘breakfast cereals’ and ‘breads’ so as to make a more informed choice as to a healthy breakfast option. However, research has also highlighted the need for caution, as it suggests that consumers seemed to infer general healthiness on the basis of a specific claim (Aschemann-Witzel & Hamm, 2010). That is, a person may infer that the product is beneficial to their general health – or multiple aspects of their health – when, in fact, the health claim given on the product packaging relates specifically to heart function. Thus people can infer information from the given claims that goes beyond what is explicitly being said and, as a result, may attribute
inappropriate additional health benefits to the product – an effect referred to as the ‘magic-bullet’ (Roe et al., 1999).Moreover, evidence suggests a tendency for health claims to be perceived more positively when presented on a product that is considered to be healthy, such as yogurt and bread (Lähteenmäki et al., 2010, Siegrist, Stampfli, & Kastenholz, 2008, Van Kleef, Van Trijp, & Luning, 2005), and that certain foods, such as bread and pasta, are considered as more suitable to carry health claims than more hedonistic foods such as biscuits (Dean et al., 2007). Furthermore, consumers were also found to prefer more naturally occurring combinations of functional ingredients and carrier products, such as the addition of calcium to milk (Krutulyte et al., 2011). However, the fact that consumers find health claims on certain products more acceptable than others should not imply that the addition of a health claim would result in a more positive attitude towards a product. For example, products already perceived by the person as being ‘healthful’, such as yogurts, were found not to benefit from the addition of a claim, while less healthy products, such as mayonnaise, were found to benefit from the addition (Giménez, Ares, & Gámbaro, 2008).

Research has also suggested that disease risk reduction claims have a stronger influence on the perceived healthiness of a product than a general function health claim, and that claims relating to certain types of disease, such as heart disease, cancer and Osteoporosis, are preferred to others, such as mental health and skin protection (Van Kleef et al., 2005). Such differences might be explained by a preference for personally relevant information. Indeed, Lalor, Madden, McKenzie, and Wall (2011) found a propensity for people to judge food products more positively when the product carried a health claim relating to a condition affecting a friend or family member. Furthermore, Dean et al. (2007) found those who reported the need to pay attention to their health perceived more benefits in functional products than did those reporting a low need to pay attention to health. This finding is consistent with assumptions underpinning models of health behaviour, such as the Health Belief Model (HBM), which holds that a person will take action to ‘ward off’ illness, if they consider themselves as susceptible to the condition or believe it to have potentially serious consequences, and that the benefits of their actions will outweigh any potential costs (Rosenstock, Strecher, & Becker, 1994). Research has also suggested that, in general, consumers prefer health claims to comprise of short,
more succinct wording (Williams, 2005, Kapsak, Schmidt, Childs, Meunier, & White, 2008).

Finally, understanding of health claims by the ‘average consumer’ cannot necessarily be considered universal across all EU member countries. The cultural diversity in consumer habits across EU countries makes legislating for the ‘average consumer’ a challenge for both national and local authorities, and highlights the need for a greater understanding of consumer use of health claims. For example, Saba et al. (2010) found that although the presence of disease risk reduction claims on products positively influenced people’s perception of their healthiness in all countries tested (Finland, Germany, Italy and the UK), it was only in Finland and Germany that these claims positively impacted on people’s intention to actually purchase the product. Furthermore, it was only in the UK that foods carrying general function claims were perceived to be both healthy and likely to be purchased by the consumers, whereas in Italy, consumers were found to express a preference for foods without any claims at all. The findings of this study are thought to reflect the historic differences in food labelling between the EU member countries. For example, Finland has a long history of using health claims on foods, whereas Italians are not as familiar with this practice.

To conclude, research has thus far indicated that there are a range of factors influencing consumers’ understanding and attitude towards health claims. However, there is an assumption underlying this body of research that attitude towards health claims reflects actual consumer behaviour, with research findings often based on subjective self-report measures rather than a more direct – and objective – measure of consumer behaviour. More research is therefore needed to gain a more thorough understanding of consumers’ understanding of health claims.

1.1.5 Images as Health Claims

A factor that may affect consumers’ understanding of health claims - and one that has received little research attention - is the legislative assertion that an image can in itself be a health claim. That is to say, seemingly innocuous visual information provided on the product’s packaging could be sufficient to lead consumers to infer health claims. It is worth noting that although the use of health claims in the UK is governed by EU legislation, a similar position on the use of
images as health claims is taken by other administrations. For example, in the USA the Food and Drug Administration (FDA) cite ‘symbols’ as a type of health claim and illustrate this by including a ‘heart symbol’ as an example (FDA, 2013), and in Canada “Health claims may be stated explicitly with words, or implied through symbols, graphics, logos or other means such as a name, trademark or seal of approval” (Agriculture and Agri-Food Canada, 2012, p. 6). However, little research has been conducted on the use of images as health claims. Images are subjective, versatile, depict abstract concepts with ease and transfer well across cultures; thus they are commonly found on product packaging. Yet, it is the very nature of images that makes them comparatively difficult to regulate. That is to say, the subjective nature of images - coupled with the lack of a definitive definition in relation to their use as health and nutrition claims – means that it is difficult for regulators to separate purely decorative images from more functional ones. Furthermore, consumers might be confused by the wide variety of imagery displayed on product packaging. Thus packaging imagery - rather than acting as a source of information for the consumer on for example, the product or its function - could instead act as a source of misinformation. It is therefore important to understand how all aspects of the packaging environment interact to influence consumers’ beliefs about a product’s function.

Numerous different pictures, graphics and symbols can be found on product packaging, or more specifically the front-of-pack label. Consumers might be familiar with the use of the UK Food Standards Agency Traffic Light scheme (FSA, 2007). These symbols provide both factual information in the form of Guideline Daily Amounts (GDA) and information presented through the use of colour. Other familiar front-of-pack images might include those indicating that the product is organic, gluten free or suitable for vegetarians, such as a picture of a leaf or ear of corn. Such images would not be classified as health claims according to the definition set out in Regulation EC 1924/2006 and are therefore not of direct interest to the research set down in these pages. However, although these images are not considered as health claims under the regulatory definition, it is possible that consumers do indeed interpret such images as health claims. For example, the presence of a symbol, such as a leaf indicating that the product is organic, might lead the consumer to make the erroneous inference that a natural or organic product is
more beneficial to their health, and thus the symbol acts as a health claim. Although the research presented in this thesis is primarily concerned with the use of health function images – that is, those images which portray a specific health function - there are some examples of more general health logos in use that warrant further discussion. These include the Smart Choices logo (Lupton et al., 2010), the Swedish Keyhole (Larsson, Lissner, & Wilhelmsen, 1999) and the Healthy Choices ‘checkmark’ (Dotsch-Klerk & Jansen, 2008). These logos denote a ‘general healthy choice’ rather than a specific outcome and they are part of schemes which evaluate the nutrient content of foods and establish its healthfulness in relation to other similar food types. It would be useful to examine current literature on how consumers respond to such general health symbols as these may give an indication of their likely understanding of images depicting specific health outcomes.

The Swedish National Food Administration (SNFA) introduced the ‘Green Keyhole’ symbol in 1989 in an attempt to encourage consumers to choose fat-reduced and fibre-enriched food alternatives without the need to read detailed nutritional labels. It is a voluntary scheme monitored by the SNFA and since its introduction manufacturers have brought a large variety of low-fat and high-fibre alternatives to the market place. Understanding for this symbol amongst the general population was evaluated as part of a food-frequency questionnaire. The findings revealed that the majority of participants surveyed understood the meaning of the symbol and, as a result, consumed a higher proportion of fat-reduced products compared with those with a more limited understanding of the symbol (Larsson et al., 1999).

The Choices Programme was introduced in The Netherlands in 2006 in response to the WHO’s call for the food industry to take a more active role in tackling diet-related disease. Now a global front-of-pack initiative; it aims to assist consumers in the selection of healthy food options through the use of a ‘Healthy Choices Logo.’ Products put forward by manufacturers such as Spar, Unilever and Weetabix, are evaluated against a set of international dietary guidelines established by an independent international scientific committee (Dotsch-Klerk & Jansen, 2008). A survey of Dutch consumers reported a significant awareness of the logo one year after its introduction (Vyth et al., 2010).
The Smart Choices Program in the USA also sought to provide a simple front-of-pack symbol system to direct consumers to smarter food choices, with the aim of encouraging people to eat a more balanced diet and consume more beneficial foods (Lupton et al., 2010). The symbol was a green tick with the accompanying words “Smart Choices Program Guiding Food Choices” appeared on products from several large foods manufacturers (e.g., Unilever and Kellogg), from August to October of 2009. The program received criticism after several of its manufacturers adjusted nutrient levels in their sugar-rich products so as to enable them to meet the criteria for carrying the Smart Choices Logo (Ruiz, 2009). The program was postponed indefinitely in October 2009.

In addition to the criticisms levelled at the Smart Choices Program, Andrews, Burton, & Kees (2011) highlighted a further problem of having a single generic ‘healthy choice’ logo on Front-of-pack labels. They compared the Smart choices logo against the more complex combined traffic light/GDA symbol, and a no symbol condition and concluded that the presence of the Smart Choices health logos may be acting as ‘implicit health claims’ from which positive consumer inferences can occur and argue that consumers may be potentially misled in their evaluation of overall product healthfulness.

Despite the criticisms, advocates of the general health logo approaches argue that the presence of a general health logo quickly communicates the healthfulness of the product, without the need for any numerical processing by the consumer at point-of-purchase, thus potentially being more useful in a real shopping situation (Hodgkins et al., 2012). Indeed, van Herpen and van Trijp (2011) found that general health logos enhanced healthy product choice in a supermarket environment, and Kapsak et al. (2008) established that consumers showed a preference for a simpler, more direct and positive message about the health benefits of food. In a study exploring health-related images, Saba et al. (2010) showed that the addition of simple symbols to a product’s package—either a ‘natural’ symbol of a plant leaf, or a ‘medical’ symbol of a cross with Rod of Asclepius—led participants to give higher scale-ratings of the overall healthiness of the product. However, the extent of these ratings and subsequent ‘willingness to buy’ differed significantly across the four countries tested. In a similar study, Carrillo, Fiszman, Lähteenmäki, and Varela (2014) presented participants with four symbols; (1) olives; (2) a person running
toward the sun; (3) heart with a stethoscope, and (4) gears. Participants undertook a word association task for each image; the results showed that participants frequently associated these images with general health-related concepts (e.g., well-being, healthy), as well as more specific health functions (e.g., energy, strength, good for heart). It is interesting to note that all four of the images generated health-related connotations even when no direct reference was made to health; such was the case for the image of gears. Carrillo et al. (2014) concluded that packaging imagery is both more appealing to consumers and more convincing of a product’s ‘healthfulness’ – regardless of whether the images relate directly to health – than text-based health claims presented alone on the packaging.

This literature indicates that consumers are using general health images present on a product’s packaging – and in some cases non-health related images - to draw inferences as to that product’s health function, and that in effect, these general health images are acting as health claims. It further indicates that these inferences may be either of a general nature (e.g., ‘this product is beneficial to my overall health ’), or relate to a specific aspect of health (e.g., ‘this product is good for my heart’). It is these more specific inferences that are cause for concern as it suggests that images have the potential to mislead the consumer as to a product’s health function. One way to potentially overcome this problem is through the use of a more specific – or functional – health image, that is to say, one that depicts a specific health function, such as a ‘heart’, ‘bone’, or ‘brain’. Although symbols (2) and (3) used by Carrillo et al. (2014) may be considered examples of functional health images, research into the use of this type of ‘functional image’ is sparse, with current research favouring the study of more general health symbols and imagery. It is for this reason that the research studies presented in this thesis have focused on the use of images and symbols which could be interpreted as either a general function health claim or a disease risk reduction claim as defined by Articles 13 and 14 of Regulation EC 1924/2006. Further research into the use of this ‘functional imagery’ is all the more necessary given that such images are already in use within the industry, such as the partial heart outline that forms part of the Benecol® logo (Benecol Limited, 2014), and the silhouette of a women’s waist with a downward arrow found on Activia yogurt by Danone (Danone Limited, 2014).
1.1.6 Section Summary

Current EC legislation regulates the use of health and nutrition claims – both written and visual – on food and dietary supplement product packaging with the aim of eliminating claims that could potentially mislead the consumer. Consumers generally perceive the addition of health and nutrition claims to a food product as positive and a useful means by which to gain information. Specifically, research has suggested that consumers hold a positive attitude towards verbal – or written – claims (Grunert & Wills, 2007). Moreover, consumers tend also to perceive products with written health claims as ‘healthier’ than products that don’t carry such claims (Van Trijp & Van der Lans, 2007). However, there is also evidence to suggest that it is the visual imagery on a product’s packaging that influences consumers’ perceptions of a product’s ‘healthfulness’. For example, Carrillo et al. (2014) suggested that packaging imagery is both more appealing to consumers and more convincing of a product’s healthfulness than verbal representations – or health claims – alone. Such research suggests that consumers are using imagery present on a food product’s packaging to draw inferences as to that product’s potential health function; packaging imagery therefore has the potential to lead or mislead the consumer. Current research into the use of images as health claims has focused on the use of general health imagery, rather than more specific – or functional - health imagery.
Part Two: Models and Theories

1.2.1 Product Packaging as a Means of Communicating with the Consumer

Product packaging is the main way of communicating with the consumer at the point of sale. Harckham (1989) notes that packaging is often the shopper’s window to the product, as it projects an initial impression about the product, its brand, qualities and values. In a market environment, consumers often have a limited time to make decisions about a product and so the information available on front-of-pack takes on heightened importance relative to other methods of communication. When a consumer is experiencing a product for the first time, their lack of prior knowledge and experience means that they are particularly reliant on this front-of-pack information to assist them in drawing conclusions about the product and its function (Becker, Van Rompay, Schifferstein, & Galetzka, 2011). Manufacturers therefore seek to create packaging that will persuade the consumer to purchase their particular product over that of a competitor. However, the addition of information such as health claims to product packaging may be a source for conflict. Legislators aim to provide consumers with the information they require to make an unbiased and informed choice, the purpose of their message is ‘informational’; whereas manufacturers seek to improve their sales by persuading consumers to purchase their product, and so the purpose of their message is ‘transformational’ (Puto & Wells, 1984). Thus while the manufacturers must adhere to the legislation, particularly as regards to the wording of health claims carried on their product, it is important to know how the additional elements present in the packaging environment might influence a consumer’s understanding of these claims.

Communicating with the consumer is traditionally understood in the context of a three-stage model (e.g., Berlo, 1960). The process comprises a ‘sender’; this is a body, such as the manufacturer, who wishes to communicate their message to the consumer. A ‘mode of communication,’ such as a product’s packaging on which the manufacturer can display their message, and the ‘receiver,’ or consumer, for whom the message is targeted. However, the behavioural reaction of the receiver depends on their processing of the message after they receive it. A further model of consumer behaviour – the Hierarchy of Effects model by Lavidge and Steiner (1961)
– details the stages consumers go through after receiving the message. This model suggests a ‘cognitive response’, or evaluation of the information, made by the consumer using both knowledge and perceptions acquired through either their direct experience with the product, or their pre-existing ‘schemas’ retrieved from memory. This cognitive response allows a person to formulate an attitudinal judgement towards the message. This response is followed by an ‘affect component’, where the consumer assesses their emotional and ethical feelings towards the message, and finally the consumers’ ‘behavioural reaction’ to the message, which may include an intention to purchase or consume the product.

The focus of the research question for this thesis is concerned with the consumers’ cognitive response to information, rather than any behavioural intention or resulting action. Specifically, the research question centres on furthering our understanding of how visual information present on a product’s packaging is used by the consumer to formulate their decision as to the product’s health function. The remainder of this section will therefore begin by examining the formation of attitudinal judgements towards a product, before moving on to explore models and theories underpinning decision-making.

1.2.2 Beliefs and Attitudes

A “belief” – or what a person holds to be true or real – refers to the subjective judgements held for some aspect of the world (Underwood, 2009). A belief is formulated through the association of an ‘object’, such as a health claim or product packaging, with an attribute. These associations result from an individual’s experience, whether direct or indirect, with the object (Eagly & Chaiken, 1993). That is to say, a belief may result directly from a person’s experience with a food product, such as viewing the images and claims displayed on its packaging, or indirectly through the word of friends and family members or exposure to mass-media advertising campaigns. It is however, important to retain the distinction between knowledge and belief; a belief may be factually correct or incorrect, yet still be held as ‘true’ by the individual (Ajzen, 2005). Furthermore, multiple beliefs may be held for the same object, although only those most salient and easily accessible in memory are assumed to determine a person’s attitude (Fishbein & Ajzen, 1975). Some researchers see beliefs as constituent components of ‘attitude’, specifically as a
‘cognitive’ or ‘knowledge-based’ component that is distinct from the affective and behavioural components of attitude (Ajzen, 1989, 2005, Eagly & Chaiken, 1993). However, others have treated attitudes as a particular kind of belief (e.g., Abelson, 1986, Abelson & Prentice, 1989). Both descriptions do however suggest that attitude and belief changes are typically governed by the same techniques and processes (Petty & Wegener, 1998), and that belief change has an important role in shaping both our attitudes and memories for an object (Nash, Wheeler, & Hope, 2015).

The definition and study of attitudes has endured a long history (Eagly & Chaiken, 1993). As early as 1935 attitudes were defined as “a mental and neural state of readiness, organised through experience, exerting a directive and dynamic influence upon the individual’s response to all objects and situations with which it is related” (Allport, 1935, p. 810). Scholars agreed that attitudes were the result of more than a fleeting evaluation of an object; rather they were developed over an extended period of time and were the result of repeated reinforcement. As such, attitudes were considered to be both enduring and stable, and thus relatively difficult to change. Furthermore, Rokeach (1968) suggested that beliefs combine to produce an attitude and defined an attitude as “a relatively enduring organization of beliefs around an object or situation predisposing one to respond in some preferential manner” (p.112). However, as attitude research developed through the twentieth century definitions such as these were deemed to be too general. Later definitions were therefore largely reduced to evaluative components. For example, Daryl Bem simply defined attitudes as “likes and dislikes” (1970, p.14). Similarly, Eagly and Chaiken (1993) defined attitudes as “a psychological tendency that is expressed by evaluating a particular entity with some degree of favour or disfavour” (p.1). Indeed attitudes can be seen as a person’s evaluation – positive or negative – for the people (i.e., doctors), objects (i.e., food and dietary supplements), events (i.e., Cancer screening), behaviours (i.e., smoking, going to the gym, and drinking alcohol), and just about anything else they experience in their environment. In the same way that attitudes are said to flow reasonably and spontaneously from beliefs, so intentions and actions are seen to follow from attitudes (Ajzen, 2005). The theories of Reasoned Action and Planned Behaviour propose that, in general, people intend to perform behaviour if they hold a positive attitude towards that object and the expected outcome behaviour (Fishbein & Ajzen, 1975, Ajzen, 1991). In short, it is
posited that actions towards an ‘object’ will follow directly from behavioural intentions, which in turn result from an evaluation consistent with attitude, that derive from salient and accessible beliefs.

Attitudes may however be much less enduring and stable than has traditionally been assumed (Schwarz & Bohner, 2001). After all, attitudes are hypothetical constructs that cannot be directly observed, only inferred from a person’s self-report and behaviour. These measures are highly context-dependent. For example, Schwarz and Bohner (2001) point out that answering a self-report question requires respondents to first interpret the question being asked, then retrieve relevant information from memory, before next using this information to compute a judgement, and map it onto the response set provided by the researcher. All of which has implications for the notion of enduring and stable attitudes. This apparent malleability of attitude may simply reflect measurement errors (Schuman & Presser, 1981). However, others, such as Schwarz and Strack (1991), suggest that attitude measures are simply measures of evaluative judgement that respondents construct at the time of questioning. In this respect the traditional view of attitude may not be particularly useful, and more may be gained from studying the underlying judgemental process. Consequently, examining models of attitude change and persuasion may help us to understand how attributes of a product’s packaging, such as an image or a health claim, contribute to a consumer’s belief as to the product’s function.

1.2.3 Dual – Process Theories

Traditionally, models of attitude change and persuasion were known as ‘cognitive-response models of persuasion’. These models assumed that persuasion triggered a simple and systematic cognitive response in the person trying to make sense of the new ‘persuasive’ information (Samson & Voyer, 2012). These single – process route models were quickly deemed to be too simplistic, and researchers instead turned towards dual – process models in an attempt to better understand persuasion and attitude change (Petty & Briñol, 2008).

Dual – process theories propose two qualitatively different modes of information processing that operate in making judgements and decisions (Chaiken & Trope, 1999). The first - referred to as system 1 - is a fast, associative, information
processing mode based on low-effort heuristics, whereas the second - or system 2 - is a slow, rule-based information processing mode based on high-effort systematic reasoning (Chaiken & Trope, 1999, Kahneman, 2003, 2011, Stanovich & West, 2000). In terms of food related decision-making researchers, such as Verbeke (2005, 2008), suggest that the processing of information and the decisions that result, are often based on heuristics or follow peripheral routes of information processing. That is to say, it cannot be assumed that a consumer will actively search for, pay attention to, or process information even if doing so would result in the improved knowledge necessary for them to make a decision. This challenges the more rational view, which assumes that people are persuaded to the formulation of judgements through the reasoned and careful consideration of arguments and evidence (Larson, 2009).

In the sections that follow, I will consider two of the most dominant dual-process theories in consumer research, the elaboration likelihood model (ELM) and the heuristic-systematic model (HSM).

1.2.4 Elaboration Likelihood Model (ELM)

The Elaboration Likelihood Model (ELM) was developed by Petty and Cacioppo (1979, 1985, Cacioppo & Petty, 1981) as a framework in which to organise social psychological research on persuasion. This model suggests that when a person receives a message, such as a health claim, it is the way they think through the message that is the key to understanding attitude change and persuasion. The ELM proposes that there are two distinct routes to persuasion. The first, known as the ‘central route’, results from a person’s careful and thoughtful consideration (or elaboration) of the message’s issue-relevant argument; this is comparable with ‘system 2’, as defined by Kahneman (2003, 2011). Elaboration likelihood is said to be high when conditions foster a person’s motivation and ability to engage in issue-relevant thinking (Petty & Cacioppo, 1979, 1985, Cacioppo & Petty, 1981). This means when a person reads a health claim they are likely to; [a] attend to the argument presented in the health claim; [b] attempt to access from memory, relevant associations, images and experiences; [c] further scrutinise the health claim in the light of this accessed information; [d] draw inferences about the merits of the health claim and formulate recommendations based upon their analysis; and [e] formulate an attitude towards the health claim and the carrier product. This attitude may be
newly created, or incorporated into an existing attitude based on information taken from a schema (Cacioppo & Petty, 1984). This analysis of a message, such as a health claim, suggests that when elaboration likelihood is high, there will be considerable allocation of cognitive resources to the task.

Of course, people are not always motivated, nor are they able to, scrutinise every message they receive in this way – it would simply not be adaptively advantageous for them to do so. Therefore, a second persuasive pathway – known as the ‘peripheral route’, which is comparable with system 1 as defined by Kahneman (2003, 2011) - can be utilised when the person’s motivation and/or ability to engage with the message is reduced. Consequently, when elaboration likelihood is low, it is expected that consumers will not give much thought to the health claim’s content; rather they will instead make use of other packaging elements – or ‘peripheral cues’. These peripheral cues can take the form of any number of elements present in the packaging environment (e.g., images, graphics, logos, packaging colour and shape).

The ELM is considered to be a continuum characterised by complete elaboration of all issue-relevant information at one end and no thought about it at the other. Attitude change resulting from a central route is likely to be more enduring than those arising from a peripheral route. Haugtvedt & Petty (1992) challenged the newly formed attitudes of participants and found that attitudes formed as a result of considering the issue relevant arguments of the message – or using the central route – were more resistant to the challenge than attitudes formed on the basis of peripheral cues.

Research has demonstrated that there is a combination of factors considered to influence motivation, and thus determine whether a cue is processed using a central or a peripheral route (Payne, Bettman, & Johnson, 1993). For example, when a message matches a person’s self-schema, he or she is more likely to engage in elaboration (Wheeler, Petty, & Bizer, 2005). Those high in a need for cognition are more likely to process the message using the central route, compared with individuals with a low need for cognition (Haugtvedt & Petty, 1992). In addition, factors considered to influence a person’s ability to process a message include a low level of external distraction, message repetition, and high message comprehensibility (Lien, 2001). Furthermore, a consumer’s involvement in the processing of a message will vary depending on their level of expertise for the product category.
(Samson & Voyer, 2012). For example, research suggests that experts value a more in-depth (or system 2) approach to processing, whereas non-experts prefer a more heuristic (or system 1) approach (Alba & Hutchinson, 1987).

Evidence also suggests that relevant images (i.e., those that convey product-relevant information) can increase issue-relevant elaboration (Childers & Houston, 1984), whereas irrelevant images are thought to operate more like peripheral cues (MacInnis & Price, 1987). A study by Peracchio & Meyers-Levy (1997) examined how characteristics of persuasion adverts influenced the cognitive resources required to process the adverts under high and low motivation conditions. Participants performed a reaction-time task while viewing adverts featuring either narrative or statement-based product claims, on layouts that either separated or integrated the text and picture. The findings of this study suggest that factors such as text and layout of an advert can affect the balance between the cognitive load required for a person to process the adverts and the cognitive resources available to that person. Furthermore, highly motivated individuals were found to evaluate the advertised product using a predominantly central route, whereas those lower in motivation were found to use more non-relevant – or peripheral information.

The ELM assumes that a consumer would process information using either a central or a peripheral route. Depending on the consumers’ level of motivation and ability, they would attend to either the peripheral characteristics of the product, such as any images or brand identifiable information (peripheral route), or engage in the more effortful information processing required in order to assess the quality and accuracy of the message, such as that set out in a health claim (central route). However, it is possible that a consumer is interested in utilising both types of information (Samson & Voyer, 2012). The Heuristic-Systematic Model (HSM) was the first model to suggest an interaction between the two routes, allowing a simultaneous effect of heuristic and systematic processing (Petty, Wegener, & Fabrigar, 1997).

1.2.5 Heuristic-Systematic Model of Information Processing (HSM)

The Heuristic-Systematic Model of information processing (HSM) shares many of the same concepts and ideas of the ELM. Both models were developed in the early 1980s and both maintain that people can process persuasive messages in
one of two ways. The HSM maintains the assumption that people wish to hold accurate attitudes—that is, to attain attitudes that are perceived to be congruent with relevant facts—and that both heuristic and systematic processing can be used to achieve this objective (Eagly & Chaiken, 1993).

As with the central route of the ELM, systematic-processing is defined as a process by which people scrutinize all informational inputs for their relevance and importance to the judgement task (System 2). Chaiken, Liberman, & Eagly (1989) suggests that systematic-processing occupies the upper end of a continuum and thus requires considerable effort and cognitive capacity. Again, like the ELM, the HSM assumes that individuals must be motivated to undertake systematic-processing. By contrast, heuristic processing is a more limited system (System 1), demanding less cognitive effort and capacity than the systematic system, it is said to occupy the lower end of the processing continuum. When processing heuristically, an individual focuses on a subset of available information that allows them to use simple inferential rules and schemas to formulate judgements and decisions about the message. Heuristic processing would therefore allow consumers to make quick decisions in complex consumer environments. However, as with the ELM, attitudes developed through the more limited heuristic processing system are likely to be less stable, less resistant to counterarguments, and less predictive of subsequent behaviour change, than attitudes developed by systematic processing (Chaiken, 1980).

Factors, such as knowledge and interest in the message topic, are also thought to have an influence on the processing system selected. People interested in healthy eating will likely be more motivated to process health claims (Roininen, Lähteenmäki, & Tuorila, 1999), whereas those who are more knowledgeable about food and health will find it easier to process the health claim information than people with less relevant knowledge. For example, a study by Cook, Burton, and Howlett (2011) found participants with a pre-existing diagnosis of either high-cholesterol or hypertension to be the greatest users of nutrient information on food and beverage packaging. In addition, they found morbidity status to be a predictor of the type of nutritional information the participant would attend to. That is, those with hypertension tended to make significantly more references to sodium, when compared to the control group, whereas those with high-cholesterol attended more to
the reported cholesterol levels of the product. During systematic – rather than heuristic processing – consumers are likely to consider more specific aspects of a product’s information, such as any health claims or nutritional information, whereas more accessible front-of-package information, such as visual images, is likely to be attended to if heuristic processing is employed.

Although the ELM and HSM have much in common, there are a few notable differences between the two models. For example, the ELM maintains the view that heuristic processing is just one component of the peripheral route. It therefore posits that it is possible for a demotivated person to think about issue relevant information and generate novel inferences, rather than utilizing a stored schema. In this instance the person would be using the peripheral route, but not processing heuristically. Another point of contrast centres on the HSM’s argument that the impact of systematic and heuristic processing can both increase with elaboration likelihood. In fact, the HSM purports that as long as the two modes of processing are not producing conflicting evaluations; heuristic processing can enhance whatever systematic processing has occurred. This is because the HSM regards processing as a continuum, with heuristic processing predominantly occupying the lower end, and systematic processing, the upper end. However, the presence of systematic processing at the upper end of the continuum does not overshadow the continued operation of heuristic processing. This notion is largely in contrast to the ELM’s view that a ‘trade-off’ exists between central and peripheral processing.

1.2.6 Source Monitoring Framework (SMF)

Past experiences, expectations and schemas are important components of the consumer decision-making process. However, it does not necessarily follow that these informational components, retrieved from memory, are either correct or come from reliable sources. Indeed, when the time comes to make use of this information it is often difficult to remember the source. Knowing the source of information plays an important role in determining our opinions and beliefs for it.

When a person recalls a memory it does not come with a convenient tag or label identifying its original source. Rather, as part of the process of remembering, the memory is appraised for any attributes that may indicate its source of origin (Johnson, Hashtroudi, & Lindsay, 1993). That is to say, the various aspects of the
memory’s content are used by the rememberer to determine from which of their past experiences the memory originated (Lindsay & Johnson, 2000). This type of source-monitoring decision is a central aspect of the source-monitoring framework.

Many source-monitoring decisions are made rapidly and without conscious awareness. However, sometimes a more strategic process is required. In this instance, decisions tend to be made more slowly and deliberately and involve the retrieval of supporting memories, noting or discovering relations, and initiation of reasoning. Johnson et al. (1993) advocate that source-monitoring relies on the use of two decision-making processes, similar to the system 1 and system 2 processes described above. Heuristic judgements – those made quickly and without conscious awareness – make use of perceptual, contextual and event-related information (System 1). By contrast systematic judgements, although making use of the same information, form part of a conscious decision-making process (System 2). Due to their efficiency, heuristic judgements are the most frequently used. Source-monitoring errors can however occur if a person’s judgements lead them to conclude that an event is unlikely to have occurred or belongs to an incorrect source.

The efficiency of the source-monitoring process can be affected by motivational and social factors (Barber, Gordon, & Franklin, 2009). For example, it would be expected that individuals exhibiting high health motivation would be more ‘careful’ when determining the origin of a health claim, and thus utilise both heuristic and systematic processes, as opposed to just one. Furthermore, the accuracy of source-monitoring is fundamentally dependent on the quality of the information encoded into memory at the time of the event. Factors such as stress or divided attention may disrupt the encoding of context relevant information that may later be called upon to determine the information’s source (Johnson et al., 1993). This is important to note as consumer judgements often take place in a busy and distracting multi-stimulus environment. However, it is not only the quality of the information that is a factor in attributing source, rather it is also the quality of the decision process when source-monitoring judgements are made (Johnson et al., 1993). Factors limiting decision processes also disrupt source-monitoring. Time pressure, stress and distraction all decrease people’s ability to engage in the judgement process (Johnson et al., 1993).
The source of information retrieved from memory is not an either-or concept. Rather, source can be specified to differing degrees. For example, you may remember that your yogurt carries a health claim, but not what the health claim refers to. Or you may remember a health claim, such as “Calcium supports strong bones”, but not when or where you read it nor on which product. Thus according to the Source-Monitoring Framework, source attributions are made to differing degrees of specificity, with differing degrees of confidence, and depending on the information available (Johnson et al., 1993). When an individual cannot remember the source of the information, they may guess at it based on their prior schematic knowledge (Bayen, Nakamura, Dupuis, & Yang, 2000). Prior knowledge is useful in real life source-monitoring decisions, as there is often a relationship between information and its source. For example, on attempting to attribute a source to your recalled health claim “Calcium supports strong bones”, your prior knowledge and experience of purchasing yogurt, may guide you to conclude that this product is the likely source of the claim. However, relying on prior knowledge, and source schemas in particular, may lead to source misattributions. For example, it is equally possible that you read the health claim “Calcium supports strong bones” on a carton of milk. There is little doubt that source-monitoring is easier when the characteristics of the source are distinct and different (Johnson et al., 1993). Although, in most everyday situations, it would be advantageous to make source judgements based on plausibility and conformity with prior source knowledge and schemas, as in the majority of cases this would lead to a correct source judgement. Evidence in support of this notion comes from the work of Bayen et al. (2000). In this study participants were provided with the name of a room (e.g., bedroom) and a list of objects, some of which one would expect to find in that room (e.g., pillow) and others which one would not expect to find (e.g., soap). The researchers found correct source identification of the object to be higher when it was expected for its source (i.e., a pillow in a bedroom) as opposed to being somewhat unexpected for its source (i.e., soap in a bedroom). Further analysis of these findings revealed that when participants did not remember the source of the information, they ‘guessed’ that it was presented by the expected source. However, while the results of this study suggest that participants used source schemas to make source judgements Bayen, Murnane, and Edgar (1996) point out
that empirical measures of source identification cannot disentangle source memory and source guessing.

The examples above outline cases of external source monitoring. This is where a person is required to discriminate between externally derived sources. However, sometimes people confuse actual events with those they have only thought or imagined. This ability to distinguish between externally generated information, such as an event, and internally generated information, such as thoughts and mental images, is referred to as reality monitoring (Johnson & Raye, 1981). According to the source-monitoring framework, our source schemas – or pre-existing expectations about a product and its function - can distort memory because they promote thoughts and mental images which, when later retrieved, feels very much like memory of real experiences. For instance, if the image present on a product’s packaging makes a person think about that product being good for the heart, then when he or she later attempts to remember the health claim they saw, positive claims about heart function should come easily and clearly to mind, accompanied by a strong feeling of familiarity. These memory-like characteristics might then lead the person to incorrectly conclude that they had previously seen a health claim relating to heart function rather than just thinking about one, a phenomenon referred to as a reality-monitoring error.

1.2.7 Heuristic Processing

The dual-process theories outlined above suggest that decision-making is not only dependent on the content of the information or message we receive, but also on the metacognitive experience of processing that information (Schwarz & Strack 1991). Specifically, these theories propose the existence of two information-processing systems. However, evidence suggests that consumers primarily use heuristic processing as a means to reduce the amount of information they need to search and evaluate before making a decision about the product (Payne, 1976). The following paragraphs will therefore outline two types of heuristic reasoning - Schemas and Processing Fluency - that would fall into system 1 of a dual-processing theory.
1.2.8 Schemas

The concept of a schema is not something new. For instance, Psychologist Frederic Bartlett was one of the first to introduce the notion of a ‘schema’ in his 1932 book *Remembering*. In this book he argued that people organise the abundant images and other information encountered on a daily basis into meaningful patterns as a way to later facilitate memory recall. A schema can therefore be defined as a general representation or ‘script’ that we have created based on our prior experiences and expectations. Stored in our memory, they can be drawn upon to help inform our interpretation of the task at hand. In essence, schemas serve to ease our processing of novel information and social experiences.

Research has shown there to be several different types of schema that a person can draw upon (Fiske & Taylor, 1991). For example, ‘event schemas’ are scripts that describe the sequence of events for everyday activities, such as shopping at a supermarket. Based on our prior experiences, we hold expectations about the sequence of events that will occur in that situation and this knowledge allows us to behave accordingly. For instance, our previous knowledge of shopping in our local supermarket will help inform our behaviour when we move to a new area and are required to shop in a different supermarket. However, the very existence of such a schema may make deviating from our routine to engage in novel behaviours more difficult, and thus may result in ‘habit’ formation. ‘Self-schemas’ refer to the conceptual representation we hold about ourselves. It has been argued that individuals will only intend to carry out behaviour if it fits with his or her own self-schema (Fiske & Taylor, 1991). Furthermore, a person has a tendency to only remember information that is relevant to their self-schema and will resist information in the environment that is contrary to it (Kihlstrom, Beer, & Klein, 2002). By contrast, ‘role schemas’ – commonly referred to as ‘stereotypes’ – are the expectations we have for people occupying specific societal roles, whether that role is achieved (e.g., teachers, doctors, police officers, nurses etc.), or ascribed (e.g., race, age, gender). For example, family doctors and pharmacists are generally regarded as the most credible sources of health information, whereas TV advertisements, newspapers and magazine articles are among the least reliable (Worsley, 1989).
Consumers hold various schemas about the different products they have come into contact with. These schemas may comprise multiple attributes; such as the product’s brand, marketing and sales tactics, product category, ingredients, nutritional content, or health function, to name but a few. For example, a consumer’s schema about a fruit juice drink may encompass a wide range of features, such as, “it’s sweet tasting, made from real fruit, contains vitamins, and usually served chilled” (Meyers-Levy & Tybout, 1989). These schemas also allow us to hold certain expectations about a product and its function. For example, in a study examining consumers’ expectations of milk desserts, Ares and Deliza (2010) found that both the shape of the packaging and its colour influenced consumers’ expectations of liking for the product and willingness to purchase it. In addition, it also influenced their expectation of product texture, with round yellow pots expected to contain a soft creamy desert, and square black pots to contain a bitter chocolate desert. In a similar study, Becker et al. (2011) compared the influence of angular and curvy packaging design on taste and found that angular shapes inspired a more intense taste sensation.

When we encounter a new piece of information or object, such as an image or health claim on a product’s packaging, an existing schema is evoked. Then, as part of the heuristic decision-making process, this information is evaluated against the evoked schema. If the information encountered is consistent with the evoked schema, a positive evaluation will result. This is known as the Schema Congruity Effect (Flaherty & Mowen, 2010, Mandler, 1982). That is to say, when the information (or object) matches the evoked schema, then affect is transferred to the object. However, when a mismatch is perceived, more elaborative, or system 2, processing will be triggered. Information or objects that match the existing schema are unlikely to elicit deep cognitive processing (Mandler, 1982). Furthermore, if the schema is well developed - that is to say, the person has a strong pre-existing notion of the information or object based on their previous experiences - then the person is likely to pay close attention to information that is consistent with that schema, and ignore information that is inconsistent with it (Fiske & Neuberg, 1990). Furthermore, when a person has a well-developed schema, he or she is also more likely to remember information consistent with that schema (Fiske & Neuberg, 1990). Therefore, it might be reasonable to assume that if a person were to see an
image of a heart on a food product’s packaging, schemas relating to heart function and health would be evoked. Thus through the use of heuristic reasoning the person is likely to conclude that the food product displaying this image on its packaging is indeed good for their heart, and feel positive affect towards this product as it matches their evoked schema.

1.2.9 Processing Fluency

Processing fluency is another example of heuristic reasoning that could be utilised, as part of the consumer decision-making process. This is the “subjective experience of ease with which people process information” (Alter & Oppenheimer, 2009, p. 219). Processing fluency takes many forms (e.g., semantic priming, visual clarity and phonological priming), though Alter & Oppenheimer (2009) argue that fluency exerts the same influence on judgements regardless of how it is generated.

Researchers have observed that easily processed - or ‘fluent’ - stimuli have a tendency to be ‘hedonically marked’ and so are subsequently evaluated in positive terms (Reber, Winkielman, & Schwarz, 1998). For example, Zajonc (1968) demonstrated that repeated exposure to nonsensical stimuli (Chinese characters were presented to non-Chinese speaking participants) increased liking for these stimuli over similar but novel alternatives. This phenomenon has become known as the ‘mere exposure effect’; people's preference for previously seen stimuli to novel, but otherwise very similar stimuli. Bornstein and D’Agostino (1992, 1994) later explained this phenomenon by suggesting that people are more easily able to retrieve stimuli from memory after repeated exposures and it is this feeling of fluency that people often equate with familiarity. That is, people often infer familiarity when a stimulus feels easy to process and it is this sense of familiarity that induces feelings of positivity towards the stimuli. This feeling of positivity towards a stimulus has been found in many forms. It may, for example, take the form of a preference or ‘liking’ of the stimuli, such as was found by Zajonc (1968). Similarly, repeated exposure to initially neutral stimuli has also been found to improve participants’ self-reported mood (Monahan, Murphy, & Zajonc, 2000). Fluent stimuli are also likely to be judged as more truthful regardless of their original source (e.g., Reber & Schwarz, 1999). Furthermore, people have also reported greater feelings of confidence in their performance when a task is fluent. For example, Kelley &
Lindsay (1993) found that confidence in potential answers to general knowledge questions is based, in part, on the ease with which those answers come to mind. Their research further demonstrated that exposing participants to correct and related but incorrect answers prior to the quiz caused them to come to mind more readily during the quiz, and resulted in participants confidently reporting them as correct answers. What is more, this effect was found even when participants were warned that some of the prior exposure answers were incorrect. However, as Alter & Oppenheimer (2009) point out, feelings of confidence arising from fluency are not necessarily accompanied by greater task accuracy. They suggest that fluency artificially inflates a person’s self-assessment of their accuracy and competence for the task.

Research also suggests that processing fluency may be influenced by the congruence of stimuli (Van Rompay, Pruyn, & Tieke, 2009). Elements of a product’s packaging rarely appear alone. That is to say, product packaging comprises a multitude of constituent parts – colours, typefaces, shapes, text and of course, images – all of which imply meaning. Marketers have long been aware of the need for congruence among these elements if they are to communicate a coherent ‘message’ to the consumer (Hekkert, 2006). Furthermore, congruence between elements has been found to produce a more favourable perception of the product. For example, Van Rompay et al. (2009) found that a bottle of mineral water was judged more favourably when its shape and slogan were considered to be congruent by the consumer. In addition, Van Rompay & Pruyn (2008) demonstrated that congruence between the typeface and the product’s shape impacted positively on consumers’ perception of the brand. Congruence between the pictures and text found on a product’s packaging have also been found to lead to increased positive affect towards the product (Van Rompay, De Vries, & Van Venrooij, 2010, Peracchio & Meyers-Levy, 2005), however it should be noted that this was only found among participants with a high need for cognition. Memory for written benefit claims in advertisements was also found to be enhanced when the meaning of the claim and image were congruent (Childers & Jass, 2002).

Reber, Schwarz, and Winkielman (2004) proposed a fluency theory of aesthetic pleasure. This theory suggests that fluent stimuli are generally also experienced as more beautiful or pleasing to the senses than disfluent stimuli. It
specifically suggests that image variables such as symmetry, figure-ground contrast, and prototypicality, as well as a person’s motivational state and previous exposure, exert their influence by facilitating or impairing fluent processing of a stimulus. It also maintains that visual or semantic priming affects a person’s aesthetic appreciation through their influence on processing fluency (Schwarz, Song, & Xu, 2009). For example, Winkielman, Schwarz, Rebe, and Fazendeiro (2003) showed participants unambiguous pictures of common objects and manipulated processing fluency through the use of semantic primes. In the high-fluency condition, the picture (e.g., a lock) was preceded by the matching word (e.g., “lock”), in the moderate-fluency condition the picture was preceded by an associatively related word, such as “key”, and in the low-fluency condition by an unrelated word. Participants reported liking the pictures preceded by a matching word the most, followed by the pictures preceded by an associatively related word.

Further studies indicate that this fluency effect does not require priming to immediately precede the picture, rather a similar effect was obtained when participants studied a list of concept primes well before they were exposed to the pictures (Lee & Labroo, 2004; experiment 1). In a series of experiments, Labroo, Dhar, and Schwarz (2008) established that semantic priming could affect consumers’ preference of conceptually unrelated products by exerting an influence on fluency. One experiment by Labroo et al. (2008) aimed to investigate whether the semantic priming of decorative images found on product labels, but otherwise unrelated to the product and its function, would affect participants’ product preference. Participants were exposed to semantic primes and then asked to visualise the prime words presented to them. These primes either related to the decorative image on the product’s label (e.g., a frog) or to a control image not present on the product’s label (e.g., a truck). Participants were then briefly exposed to the products – in this case wine bottles with decorative images on their labels – before selecting their preferred product. They found that semantic priming for images that bear no relation to the product on which they were displayed (i.e., a frog on a bottle of wine), can enhance preference for the product. In a follow-up experiment Labroo et al. (2008) found that the influence of the semantic primes increased as they became more closely matched to the features of the product. These findings suggest that preference for a product is enhanced not only by priming concepts that belong to the associative network of the
object or product (e.g., Librarian and book), but also by priming concepts that facilitate the processing of perceptual features that are not commonly associated with the object (e.g., Frog and wine). It therefore seems reasonable to suppose that a health image present on the front-of-pack label of a food product could act as a visual prime and that consumers will demonstrate a more positive attitude for products carrying such visual primes regardless of whether they are conceptually linked to the product’s function as described by its verbal health claims.

In addition, research suggests that any variable, not just prior direct exposure to that same stimulus facilitates perceptual processing of a stimulus and enhances liking of the stimulus, even under conditions of a single exposure to the target (Reber et al., 1998). This has been demonstrated in a study by Lee and Labroo (2004; Experiment 2), who aimed to examine the effects of processing fluency on consumers’ judgements for products in a marketing context. Participants were required to view an advert featuring the target product (Ketchup), a similar control (Mayonnaise), or an unrelated control (Vitamins) in either a high-expectancy scenario (fast-food restaurant serving hamburgers) or a low expectancy-scenario (a woman shopping in a supermarket). Participants were then required to view and rate a series of products for their likability. The results of this study indicate that prior exposure to the product enhanced participants’ attitude towards it. Furthermore, attitudes were found to be most favourable towards the product when it had been made more accessible in memory (i.e., high-expectancy scenario), and this was true even in the absence of prior exposure. These findings suggest a positive attitude may be formed towards a product by presenting that product in a predictive context or by priming it with a related construct.

Newman, Garry, Bernstein, Kantner, and Lindsay (2012) suggest that images, specifically photographs, can provide the semantically predictive context necessary to facilitate processing and lead to illusions of both familiarity and reality. Moreover, evidence suggests that people are inclined to trust photographs, as they are often the best evidence that something has actually occurred (Kelly & Nace, 1994). Newman et al. suggest that even if the photograph does not provide direct evidence to support the target information or claim, its very presence may nevertheless be enough to boost people’s belief in it, purely because photographs are considered credible sources. In a series of studies Newman et al., (2012) showed
participants familiar and unfamiliar celebrity names, either with or without an accompanying photograph of the celebrity. Participants were required to judge the truthfulness of the claim “this famous person is alive”. The results suggest that the presence of the photograph lead to a truth bias for the unfamiliar celebrity names. This result was unsurprising given that the photographs all depicted the celebrities alive, however the same photographs were also found to inflate the truthfulness of the claim “this famous person is dead”. In a further experiment Newman et al. explored the generalizability of this effect by testing general knowledge claims paired with related but uninformative photographs. For example, the claim “Macadamia nuts are in the same evolutionary family as peaches” was accompanied by a photograph of macadamia nuts. Again, the data indicated that people thought the claims to be more truthful when presented with the photograph. Although previous research has been done exclusively with photographs, there is little reason to suppose that a similar effect would not be found with other types of imagery. Therefore, this research would seem to suggest that when a health claim is presented alongside an image, such as would be found on the packaging of a food product or dietary supplement, people would perceived the claim to be more credible even if that image did not directly validate the information given in the claim.

1.2.10 Section Summary

The focus of this thesis is on consumers’ cognitive response to health claim information presented on food and food supplement packaging. This section therefore detailed the formation of consumer beliefs and attitudes, and highlighted the importance of prior experiences with a product in the formation of an attitude towards it. Dual-process models of attitude change and persuasion suggest that two qualitatively different modes of information processing are operational in the judgement and decision-making process; system 1, based on low-effort heuristics and is a fast and associative mode of information processing, and system 2, a high – effort systematic reasoning mode. As the majority of consumer decisions take place under time pressure in a complex and multi-element environment (e.g., a supermarket), it is likely that the majority of consumer decisions result from heuristic-processing methods. Two methods of heuristic - processing - schemas and processing fluency – were therefore discussed.
Part Three: Measures of Understanding

1.3.1 Direct and Indirect Measures of Consumer Understanding

The models and theories discussed in the previous section suggest that consumers predominantly engage in heuristic reasoning in order to formulate an attitude towards a product and its function. This is contrary to the traditional view of many marketers and advertisers, who, as Maison, Greenwald, and Bruin (2001) point out, tended to assume that consumers made their product choices after consciously and rationally considering information relevant to their decision.

This section of the literature review explores the relative merits of using ‘direct’ and ‘indirect’ measures to study consumer understanding, before going on to introduce a novel indirect memory-based method to assess how front-of-pack images promote inferences about the health properties of food and dietary supplement products.

1.3.2 Direct Measures

The simplest way to assess a person’s understanding of a product and its health claims is to ask them. In fact many studies do just that, through the use of direct measures such as questionnaires, interviews and rating scales. For example, Lähteenmäki et al. (2010) sought to find out - through the use of a questionnaire design - whether consumers infer product characteristics from verbal health claims and whether these inferences were influenced by the functional ingredient, type of claim, promised benefit and framing of the claim. Their findings were contrary to other previous research which suggests that the presence of health claims increases consumers’ perception of the healthiness of the product (Urala et al., 2003; Van Trijp & Van der Lans, 2007), instead finding that health claims had, at best, a moderate impact on consumers’ perception of the product. Using a similar design, Wansink (2003) aimed to examine how the length of front-of-pack and back-of-pack health claims for ‘Soy’ affected participants’ belief in the accuracy of these health claims. Participants were approached in a shopping mall, shown some examples of product packaging and asked to first give their thoughts – cognitive responses - on the packaging examples, before responding to three statements, “people would benefit
from eating this product”, “this product may reduce the risk of heart disease” and “this should be eaten with a low saturated fat diet,” on a 9-point Likert scale (p. 310). Two researchers, blind to the conditions, next coded the participants’ cognitive responses as being (i) general evaluative thoughts, (ii) attribute- specific thoughts, or (iii) other. Responses were also classified by their valence - either positive or negative. The data indicate that participants who viewed short claims on front-of -packaging generated a greater number of product attribute-specific thoughts than those who viewed packaging with longer health claims. A direct measure was also used by Grunert, Scholderer, and Rogeaux (2011) who showed participants a commercial for a probiotic product before using a series of open answer questions, such as “After seeing this pack and commercial, if you had to tell a friend what [the product] does, what would you say?” (p. 270). Participants’ responses were then content analysed and coded, to capture whether their understanding of the health claims was consistent with the scientific basis for those claims. Participants with a more positive attitude towards the product were found to give more ‘risky’ responses to the questions – that is, they made statements that were not in line with the scientific basis for the claim, whereas participants with either a negative or neutral attitude towards the product were more likely to make vague or non-specific responses.

In an example of a study that used a direct measure to specifically investigate the influence of health images, Saba et al. (2010) found that participants gave higher ratings of overall healthiness when a simple symbol – either a ‘natural’ symbol of a plant leaf, or a ‘medical’ symbol of a cross with Rod of Asclepius - was added to the product’s packaging. Similarly, Carrillo et al. (2014) studied participants’ perception of four images - a heart-plus-stethoscope, olives, a person running toward the sun, and gears – through word association, free listing and conjoint analysis. Three verbal risk/benefit health claims were shown in combination with these images. The findings suggest that participants often associated these images both with general health-related concepts, such as ‘wellbeing’, as well as more specific health functions, such as ‘strength’ or ‘good for the heart’. Studies such as these suggest that direct measures can produce an effective insight into consumer decision-making, and in some cases offer empirical support for the notion that images can act as health
claims. There are however, limitations to assessing consumer understanding via such direct measures.

1.3.3 Limitations of Direct Measures

One of the most fundamental and long-standing problems with direct self-report measures is that people do not necessarily tell the truth. That is to say, when a person is asked to express their attitude towards an object or event, they may report the attitude that they believe portrays them in the best possible light (Wittenbrink & Schwarz, 2007). It is possible that studies of consumer attitudes and understanding that employ direct self-report measures may be subject to a social desirability effect. That is to say, consumers may, for example, wish to appear more ‘healthy’ in their food choices and more knowledgeable about health claims. Various strategies have been used in an attempt to limit social desirability, such as ensuring participants’ anonymity (Gordon, 1987), or deceiving participants into believing that the researcher can verify the truthfulness of a response (Sigall & Page, 1971). However, while these strategies have demonstrated a degree of success in limiting social desirability, the level of reduction required to yield a correct attitude remains unknown (Wittenbrink & Schwarz, 2007). Indeed, it is questionable that even under low desirability conditions reported attitudes are any more accurate than those obtained under normal experimental conditions (Roese & Jamieson, 1993).

Furthermore, attitudes and beliefs may be much less enduring and stable, and more context-dependent, than has traditionally been assumed (Schwarz & Bohner, 2001). The very process of obtaining data from a participant via a direct measure – such as a self-report question – has implications for the notion of an enduring and stable attitude. That is to say, the answering of a self-report question requires the participant to first interpret the question being asked, then retrieve relevant information from memory, before next using this information to compute a judgment, and map it onto the response set provided by the researcher (Schwarz & Bohner, 2001). This apparent malleability of attitude may simply reflect measurement errors (Schuman & Presser, 1981). However, others have suggested that attitude measures are simply measures of evaluative judgment that respondents construct at the time of questioning. For example, a consumer with no prior
expectations about a product’s health function may, when asked to suggest its function, quickly formulate and report an expectation that didn’t exist prior to being questioned. Thus it could be the act of questioning that prompts these cognitions, rather than them occurring spontaneously (e.g., Schwarz & Strack 1991; Schwarz & Bohner, 2001). In this respect the traditional view of attitude may not be particularly useful, and more may be gained from studying the underlying judgment process. This limitation needs to be addressed if we are to effectively assess consumer understanding, as consumer inferences and beliefs are typically formed spontaneously and without overt prompting (Kardes, Posavac, & Cronley, 2004).

Finally, most psychologists have traditionally held the view that attitudes “operate in a conscious mode” (Greenwald & Banaji, 1995, p.2). Therefore, the success of a direct measure is assumed to be reliant on people having conscious access to - and thus being capable of accurately reporting – their beliefs and cognitions (Sheeran, Gollwitzer, & Bargh, 2013). However, such reliance on access to the unconscious may not necessarily result in accurate reporting. The increased adoption of more indirect measures reflects current thinking that beliefs and cognitions can occur automatically without any deliberation. This notion is supported by research that shows persuasive influence can occur without a person’s conscious awareness. For example, Murphy and Zajonc (1993) demonstrated that subliminal priming influenced participants attitudes towards unfamiliar objects – in this instance, Chinese symbols that were preceded by subliminally presented happy or sad faces. In a similar study, Strahan, Spencer, & Zanna (2002) demonstrated that subliminally priming a goal-relevant cognition – the reduction of thirst by drinking soda – enhanced the persuasiveness of an advertisement targeting the goal, but only when people were motivated to pursue that goal.

1.3.4 Indirect Measures

In an attempt to overcome the problems associated with direct measures, psychologists have increasingly focused on the development and use of more implicit or indirect measures. These indirect measures infer, for example, the presence or strength of a particular belief, attitude or expectation, from an experimental paradigm known to be influenced by these cognitions; typically, speed
categorization tasks. Numerous indirect measures have become popular in the literature. Indeed, Nosek, Hawkins, and Frazier (2011) conducted a citation analysis and identified some twenty procedures that could be classified as an indirect or implicit measure. They found the Implicit Association Test (IAT) accounted for over 40% of citations. Evaluative Priming (EP) was the second most cited procedure accounting for approximately 20% of citations. Other procedures, such as Semantic Priming (SP) accounted for the remaining citations. The following sections will provide a brief overview of these three popular indirect measures. Although the studies contained in this thesis do not make use of any of these methods – rather, I propose the use of a novel memory-based indirect measure - I include their descriptions as a means to illustrate the kinds of methods that might be used to study implicit understanding.

1.3.5 The Implicit Association Test (IAT)

Arguably the most widely used tool for measuring implicit attitude is the Implicit Association Test (IAT) developed by Greenwald, McGhee, and Schwartz (1998). The original design of the IAT involves five separate blocks in which participants are required to rapidly categorize two target stimuli (e.g., high-fat foods vs. low-fat foods) with an attribute (e.g., positive vs. negative). When a person holds a strong association between a category (e.g., high-fat foods) and a certain attribute (e.g., positive), more rapid and accurate responses will result.

The IAT has been used as a measure of people’s implicit attitudes towards various aspects of food, dieting and eating behaviors, as well as a tool to predict consumer choice. Some of the first research in this area was undertaken by Maison, Greenwald, and Bruin (2001), who reasoned that the IAT could be used successfully to assess consumer behavior. They found that the IAT revealed significant differences between participants’ reactions to discrete beverage categories - in this case sodas and fruit juice - and that such differences were positively related to the participants’ explicit self-report ratings for the beverages. This same study also revealed that pre-existing explicit attitudes towards products were positively correlated with implicit attitudes. Specifically, the data suggest that women on a low-calorie diet had a more positive implicit attitude towards low-calorie foods, and
a more negative attitude toward high-calorie foods, than women on a non-calorie restricted diet. In 2004, Maison, Greenwald, and Bruin expanded their research in an effort to validate the IAT as a measure of consumers’ implicit brand preferences. Their research suggested that people who were found to have a preference for a particular brand on an explicit measure, also showed an implicit preference for the brand.

1.3.6 The Evaluative Priming Task

This task developed by Fazio, Sanbonmatsu, Powell, and Kardes (1986) suggests that the strength of the association held in memory between an attitude object and its evaluation determines the accessibility of an attitude. Fazio et al. suggested that the strength of these associations could be detected through a person’s responses to an evaluative word briefly presented with the attitude object. Typically, a person seated at a computer would view the attitude object, such as an item of food or a beverage, which is then replaced by an evaluative word (e.g., disgusting). The participant is then tasked with indicating whether the word, not the object, carries a positive or negative connotation as part of a response time task.

1.3.7 The Semantic Priming Task

An analogous paradigm to Fazio et al.’s (1986) evaluative priming task is the Semantic Priming task developed by Wittenbrink, Judd, and Park (1997). In this version of the priming task participants, after first being primed with a target word, are required to perform a lexical decision task by deciding whether subsequent target stimuli form either meaningful words, or meaningless non-words. If the person’s response time for categorizing positive meaningful words is quicker in the presence of the word primes it suggests they hold a positive attitude towards this group or object.

1.3.8 Evaluation of Indirect Measures

The increased use of indirect measures is largely due to the fact that they are not reliant on a participants’ willingness or ability to report a particular belief, attitude or expectation. Rather, as long as the participant follows the instructions of
the experimental paradigm, their beliefs and cognitions will occur automatically. However, notwithstanding their popularity caution is advised when interpreting outcome measures. For instance, the very nature of an indirect measure means that the outcome measure – the participants’ belief, attitude or cognition - is not clearly indicated by the participant, rather it is inferred by the researcher (De Houwer, Teige-Mocigemba, Spruyt, & Moors, 2009). Furthermore, inconsistencies have been reported between implicit attitudes resulting from indirect measures, such as IAT, and self-reported explicit attitudes. The often-low correlations found between direct and indirect measures have led researchers to suggest that the two are assessing different constructs (e.g., Karpinski & Hilton, 2001). For example, Karpinski and Hinton (2001) demonstrated that IAT did not accurately predict participants’ choice between a candy bar and an apple, whereas an explicit attitude measure made an accurate prediction. However, others have found the reverse to be true, suggesting that IAT could accurately predict choice between a snack and a fruit whereas the explicit attitudinal measure could not (e.g., Perguini, 2005). A further note of caution that should be used when interpreting outcome measures provided by IAT, is that these measures indicate relative preference rather than absolute attitude (Maison et al., 2004).

The overarching aim of this thesis is to further our understanding of the role that images play in influencing a person’s perception of the health function of a product. It therefore seems important to examine current implicit measures in relation to visual stimuli. One example of a study that has utilized visual stimuli with an implicit measure is that of Glock, Müller, and Krolak-Schwerdt (2013). The authors used a single-target IAT to investigate a phenomenon known as compensatory health beliefs (CHB), this is where a person considers that the negative effects of their behaviour, in this instance smoking, can be compensated for by other behaviours, such as exercising or eating healthily. Participants were shown a graphic warning label from a cigarette packet then asked to categorize pictures from three health conditions - smoking, healthy and unhealthy – as either ‘healthy’ or ‘unhealthy’ behaviours. Glock et al. compared the measure of CHB gained from the single-target IAT with those gained from a direct measure, and found that the graphic warning labels influenced implicit associations among smokers, but did not
affect their explicit CHBs. However, researchers have generally found there to be a substantially smaller implicit attitude size when using visual stimuli than when using comparable verbal alternatives with the IAT paradigm (e.g., Mitchell, Nosek, & Banaji, 2003; Nosek, Banaji, & Greenwald, 2002; Foroni & Bel-Bahar, 2010).

Finally, another issue with current indirect measures is that stimulus choice is also somewhat restricted. This is in a large part due to the propensity of these measures to rapidly present their stimuli. That is to say, the rapid presentation time, inherent in the procedure, greatly reduces the complexity of the stimuli that can be used – often to only single words or images. Therefore current measures are rather confining when it comes to investigating complex real-world stimuli. For example, a product’s packaging is often a complex and multifaceted environment comprising both visual and verbal components. A product may, for instance, display both a visual image, such as a bone, as well as a verbal health claim, such as “Calcium is needed for the maintenance of normal bones.” Current indirect measures would only allow for the study of a limited portion of this claim. For example, I could present the participants with the single word “Calcium”, however, under current legislation this would be classified as a nutrient claim, rather than a health claim and thus alter the variable being studied. Moreover, current indirect measures don’t allow for the presentation of the stimulus as an entire entity, that is elements of the product’s packaging could be shown sequentially – an isolated image of a bone, could precede presentation of a health claim. Although, even this would present a challenge for IAT, and besides, in a real world setting, such as a supermarket, consumers would examine these elements together to form inferences and beliefs about the product.

There is little doubt that indirect measures could afford an important insight into the role of packaging imagery on consumers’ beliefs as to the product’s function. However, current measures are somewhat limiting. This thesis therefore introduces the use of a memory-based measure as a novel indirect measure of consumer understanding.

1.3.9 Memory as an Indirect Measure of Understanding

It has been widely established amongst the scientific community that human memory is malleable. Far from being an accurate recording of our prior experiences,
memories are instead constructed (or reconstructed) from schema-consistent information that may or may not be part of the original event (Bartlett, 1932). This reconstructive nature of memory is, in reality, a double-edged sword. It has the advantage of allowing people to use schemas to infer characteristics, events, or behaviours based upon discrete information, however such reconstructions may later be falsely recalled as part of the original (Davis & Loftus, 2007).

In this thesis I propose that it is possible for us to successfully exploit the reconstructive nature of memory as a novel indirect measure of understanding. Specifically, I suggest that studying the memory errors people generate in certain contexts can offer insight into the beliefs and inferences that those people must have formed, in order for those errors to occur. For example, the memory literature suggests that people frequently recall their experiences rather differently from how those experiences truly occurred – sometimes even recalling events that never truly occurred at all. Furthermore, people’s expectations and inferences ‘shape’ their memories. That is, we use our expectations and inferences to ‘fill gaps’ in our memories. These expectations and inferences can – according to the source monitoring framework (Johnson et al., 1993) - distort memories because they promote thoughts and mental images which, when later retrieved ‘feel’ much like a memory for a real experience. To illustrate, if a product’s packaging were to make a person think about heart health – because it was displaying an image of a heart – then when the person later attempts to recall the claims they saw, positive claims about heart function should come to mind easily and clearly, with a strong sense of familiarity. These ‘memory-like’ characteristics, might then lead that person to incorrectly believe they saw those claims before, rather than having only just thought about them. The following paragraphs outline how the reconstructive nature of memory leads to the occurrence of memory errors.

1.3.10 Memory Errors

Memory is fallible and thus vulnerable to suggestion. Such malleability of memory was demonstrated in a highly influential study by Loftus, Miller, and Burns (1978). In this study participants were shown a film of a car accident; half the participants saw a film that featured a red car at a stop sign, while the remaining
participants viewed a film featuring the same car at a *yield* sign. After viewing the film all the participants were asked about the incident they had witnessed. This post-film interview included the critical question “Did another car pass the red car at the *yield* sign?” Returning to the lab on a subsequent occasion, the participants were required to say, as part of a forced choice memory test, whether the red car in the film had been at a stop or yield sign. Loftus and her colleagues found that participants who were shown consistent post-film information (i.e., viewed the film with the yield sign and asked the question about the yield sign) recalled the correct sign more accurately than participants who received the inconsistent post-film information (i.e., viewed the film with the yield sign and asked the question about a stop sign). This study demonstrated that incorrect information – or misinformation – received after an event can distort people’s memory for the original event. This misinformation effect has been widely studied and hundreds of empirical studies have been published on the suggestibility of memory to misinformation (e.g., Ayers & Reder, 1998; Loftus, 2005). All of them have used variants of the ‘misinformation effect paradigm’ developed by Elizabeth Loftus. This paradigm highlights that a person’s memory is open to error, and as such, may have important ‘real world’ applications, such as in a legal setting, or as I propose here, as a measure of consumer understanding.

The majority of research into the misinformation effect has involved the use of relatively naturalistic materials, such as stories or visual scenes with the presentation of misleading information. There is also often a relatively long delay between participants studying the materials and testing. Roediger and McDermott (1995) built on the work of Deese (1959) to develop a paradigm for the experimental investigation of false memories. In this paradigm participants are presented with lists of ‘related words’ (i.e., bed, rest, wake, tired, dream, snooze, blanket, etc.) that are presented with a non-presented ‘critical’ word, which in this example is ‘sleep’. Immediately following the presentation of the list there is a single-trial free recall task in which the participant is instructed to recall as many words as possible from the original list, without respect to their order and ensuring that they were indeed presented. A recognition variation of this task may also be used in which participants are subsequently given an old/new recognition test that includes the non-
presented critical word. Roediger, Watson, McDermott, and Gallo (2001) commented that recall for critical non-presented words occurred with approximately the same probability as the studied words and recognition of these non-presented critical words typically exceeded the recognition of presented words. Furthermore, Roediger and McDermott (1995) also established that participants maintained a high degree of confidence for the non-presented critical words, suggesting that participants not only ‘remembered’ the non-presented critical word, but that their phenomenological experience was similar to their memories for words that were actually presented. In short, participants had produced a false memory for the non-presented critical word, as a result of their expectations and inferences leading them to incorrectly conclude that they had previously seen the non-presented critical word. Studies such as these highlight how people’s expectations can shape their memories as they promote thoughts and mental images that ‘feel’ much like memories for real objects, events or experiences.

### 1.3.11 False Memory or False Belief

It is somewhat more difficult to discriminate between whether a person has developed a false belief, or a false memory, in response to (mis)information. One method used to assess the phenomenological experience of false memories is Tulving’s (1985) ‘remember/know’ procedure. In this procedure, participants are asked, following each item in the recall or recognition test, to indicate whether they ‘remember’ seeing the item during the original event, or just ‘know’ it occurs, but cannot actually remember the specific episode. The distinction between ‘remembering’ and ‘knowing’ must be carefully explained to participants with the emphasis that one can be quite confident that something happened without being able to recollect the specific experience. Do participants who receive misinformation indicate that they ‘remember’ the erroneous detail as being part of the original event? Research suggests that they do (e.g., Zaragoza & Mitchell, 1996). Subsequent studies have also made use of a ‘guess’ rating for participants to indicate no recollection and/or recognition of the item (e.g., Gardiner, Ramponi, & Richardson-Klavehn, 2002).
1.3.12 Memory Errors and Pictures

Researchers have traditionally used verbal cues as sources of suggestion (Braun-LaTour, LaTour, Pickrell, & Loftus, 2004). However, it is possible that visual cues, such as photographs, may also act as sources of misinformation (Garry & Gerrie, 2005). People consider photographs to be credible sources of information, an accurate recording, and therefore evidence that an event occurred. Hence, photographs act as a subtle form of persuasive suggestion. Photographs provide the viewer with a ‘cognitive springboard’ from which to generate thoughts and feelings associated with the depicted object and/or event; thus the viewer creates mental representations that become difficult to distinguish from actual experiences (Strange, Garry, Bernstein, & Lindsay, 2011). The source-monitoring framework (Johnson et al., 1993) suggests that these mental representations have features similar to those of experienced events, resulting in people mistakenly attributing these mental representations for photographs to actual experiences (Henkel, 2011). An example of this is seen in an experiment by Brown & Marsh (2008). Student participants were shown photographs of two university campuses, one of which was their own. Some of the photographs showed locations common to many universities, such as a library, whereas others depicted locations obviously unique to the campus. The participants were shown the photographs again after a period of either one or three weeks and were required to indicate whether they had ever visited the location depicted. The findings suggest that prior exposure increased the participants’ beliefs that they had visited locations that they had never actually visited with generic locations being rated more highly than campus specific ones. Findings such as these are important as they suggest that visual information can create a sense of familiarity in the viewer, which may result in them creating a false memory for the viewed information. Furthermore, the finding that prior exposure to visual information can influence participants’ beliefs has important implications beyond just autobiographic experience, and hints at the potential potency of persuasive advertising – a notion that will be discussed later in this chapter.

In a ‘real world’ setting, it is perhaps more likely that people will experience a combination of verbal and visual (mis)information. For example, food, beverage and dietary supplement packaging might carry both a verbal health claim and visual
images, either functional or decorative, and thus a single product has multiple possible sources of (mis)information. One might assume that the addition of a visual image to a product might act to enhance their memory for product-based information. However, research has demonstrated that such an assumption is not necessarily correct, and that the addition of an accompanying photograph has a tendency to act as a source of misinformation, and so cause people to falsely ‘remember’ erroneous information. For example, Lindsay, Hagen, Read, Wade, and Garry (2004) asked participants to view their old class photograph while reading a narrative describing a fictitious childhood event – getting in trouble for putting slime in the teacher’s desk. Findings suggest that those who viewed the photograph while reading the narrative were more likely to falsely ‘remember’ details of the fictitious event, than participants who only read the narrative. In a similar study, Henkel (2012) examined how stories (e.g., “Sabrina dropped the delicate vase” p. 775) accompanied by photographs that either, depicted the likely outcome of the story (a broken vase), or depicted details of the story but not its outcome (the vase before it was dropped), influenced participants’ inferences about the likely outcome of the story they read. The data indicate that participants who read a story accompanied by a photo that was consistent with their inferred outcome of the story were more likely to both falsely claim that they had read that outcome as part of the original story, and to also claim that the accompanying photograph depicted their inferred outcome. These findings suggest that people can’t accurately distinguish between what they have explicitly read or seen and their own internally generated inferences. While the majority of research in this area has been conducted using photographs as stimuli, it is reasonable to assume that other types of visual information, such as symbols and graphics, would produce similar findings.

1.3.13 Memory and Advertising

One of the fundamental problems when it comes to researching the effects of advertising on consumer behaviour is that, people do not want to admit – or in some cases may not realise – that they have been influenced by advertising, preferring instead to believe they are relying on their own beliefs and experiences when it comes to making decisions (Hoch, 2002). However, advertisers continually seek to
persuade consumers to alter their behaviour through the creation of product expectations (Hoch & Deighton, 1989).

Traditionally, advertising research has focused on investigating how advertising presented prior to a person’s experience with a product influences the consumers’ expectation for that product. However, according to Braun (1999), advertising can have a powerful retroactive influence on how consumers remember past experience with a product. Braun explored whether visual and verbal misinformation received as part of a post-experience advert altered people’s memory of a previously seen candy bar wrapper. Both visual and verbal misinformation affected participants’ recognition for the colour of the candy bar wrapper. However, participants were more confident in their colour rating, and in some cases even claimed to have ‘remembered’ the erroneous colour for the wrapper when the misinformation was presented visually rather than verbally. In a similar study, Braun and Loftus (1998) presented misinformation in an advertisement either as a picture or as words. They found levels of false memories to be approximately equal across conditions, but that the pictorial information led to stronger ‘remembering’ judgements.

Post-experience advertising will not however, alter memory for a prior experience if the person notices a discrepancy between the advertised (mis)information and the experienced event or product. Such discrepancy detection would occur at the point of encoding of the post-event advertisement, and ultimately have an effect on people’s beliefs and behaviour towards the product. As Braun-LaTour et al. (2004) point out, you want the consumer to be involved enough in the advertisement that they process the misinformation and make inferences from it, but not so involved that they notice the discrepancy between the advertising information and their own autobiographical experience.

1.3.14 Section Summary

This section has examined the relative merits of using current direct and indirect measures to investigate consumer understanding. Although current research has effectively utilised direct measures (e.g., Saba et al., 2010; Carrillo, et al., 2014) there is a need to further this study using indirect measures. Such advancements
arguably cannot be achieved using the available indirect measures, and thus a novel indirect memory-based method is proposed.
Part Four: Outlining the Studies

1.4.1 Rationale for Thesis

Regulators and marketers have debated the likelihood that packaging imagery influences consumers’ product understanding, yet there remains minimal empirical evidence on this issue. I therefore present in this thesis a novel method for assessing whether imagery on products’ packaging leads consumers to draw implicit and explicit inferences about health benefits.

The role of front-of-pack imagery in shaping consumers’ cognitions about health is a timely and important concern. In recent years, legislation has been developed in many countries that guides manufacturers and marketers on the exact health claims that they are—and are not—authorized to make about products (e.g., European Commission [EC], 2006). Importantly, this legislation applies to images as well as to text, because it assumes that images can lead consumers to make health-related inferences about the product inside the package (Wartella, Lichtenstein, Yaktine, & Nathan, 2011). But how valid is this assumption? Do consumers, consciously or unconsciously, treat packaging imagery as offering informational value? Clearly, the answer would be of direct legislative importance, and would shine a light on broader questions about people’s understanding of health-related information. However, different methods for answering this question offer different kinds of information.

One obvious way to determine whether people make inferences about products is to ask them. Many studies adopt this approach through direct questioning methods such as qualitative interviews and questionnaires (e.g., Lähteenmäki et al., 2010, Wansink, 2003, see Leathwood, Richardson, Sträter, Todd & Van Trijp, 2007, Williams, 2005 for overviews of methods). For instance, Saba et al. (2010) showed that adding simple symbols to a product’s package led participants to rate the product’s healthiness more positively. Likewise, Carrillo et al. (2014) showed participants simple images and, using a word association task, showed that participants often associated these images both with general health concepts (e.g., well-being, healthy) and specific health functions (e.g., strength, good for the heart).
Studies such as these offer support for the notion that images lead people to infer health properties, but they also raise questions about the nature and origin of these inferences. Johnson-Laird (1982) differentiates two distinct types of inferences: explicit, and implicit. Explicit inferences, Johnson-Laird argues, are made deliberately and consciously, by systematically considering and evaluating the available evidence. Whereas, implicit inferences, are made spontaneously and without conscious awareness, often going beyond the available evidence. Knowing which types of inferences are evoked by packaging imagery is important, not least because errors based on implicit false inferences are notoriously difficult to counter with corrective information (e.g., Guillory & Geracy, 2010). Whereas this direct approach offers valuable insights, it also suffers some limitations, as outlined in section 1.3.3 of this chapter. Therefore, to better capture these consumer inferences, one needs different methods.

Because one characteristic of implicit inferences is that they frequently go beyond the available evidence (Johnson-Laird, 1982), people’s implicit inferences often lead them to remember information that they spontaneously inferred but never truly saw (e.g., Barclay, 1973, Brewer, 1977). Memory measures can therefore offer valuable information about people’s implicit and explicit inferences, without directly asking them to form or to report such inferences. Indeed, advertising researchers have recognized memory errors as a useful index of the subtle effects of persuasive influence (Braun-LaTour & Zaltman, 1998), and such indices might illuminate the issue of how packaging imagery affects consumers’ inferences.

Importantly, memory errors arise not only when people make inferences from text, but also from images (e.g., Henkel, 2012, Garry, Strange, Bernstein, & Kinzett, 2007). Moreover, according to the source-monitoring framework (Johnson et al., 1993), inferences can distort memory because they promote thoughts and mental images which, when later retrieved, feel like memories of real experiences. For instance, if a product’s packaging makes a person think about heart health, then when they later attempt to recall the claims they saw, claims about heart function should come to mind easily and clearly, and feel familiar. These memory-like characteristics might then lead them to believe they saw those claims before, rather than having only thought about them. Thus the present research aims to apply a
novel memory-based method to explore how packaging imagery affects people’s inferences about health benefits.

1.4.2 Thesis Aims

This thesis aims to investigate the role of packaging imagery in people’s understanding of products’ health functions. Firstly, it aims to examine the influence of packaging imagery on people’s beliefs about health information, and in doing so, use direct measures to test the assumption that images can act as health claims, insofar as they can lead people to infer health properties of products. Secondly, this thesis aims to extend the findings of prior research through the use of a novel indirect memory-based measure, and in doing so, gather information on the extent to which these inferences are implicit vs. explicit.

1.4.3 Plan of Thesis

This thesis consists of seven empirical studies conducted using direct and indirect quantitative measures. Each study is presented in its own chapter that briefly outlines research relevant to the study, methodology, results and a discussion of the key findings. This is followed by a general discussion (Chapter 9), which discusses these findings in greater depth, both in terms of their implication for theory and for the regulation of images on product packaging. This final chapter will also discuss potential methodological limitations of the studies and possible areas for future research. The following sections will briefly outline the aims and hypothesis of each of my studies.

1.4.4 Studies 1-3. The Role of Packaging Imagery on People’s Beliefs for Product’s Health Function

The overarching aim of Studies 1-3 was to test the assumption that images can constitute health claims, insofar as they can prime consumers’ expectations as to a product’s function. Specifically, these studies examined the influence of packaging imagery on people’s beliefs about the health properties of foods and dietary supplements, using ‘direct’ - or ‘explicit’ - reporting methods similar to those used in previous studies, such as Lääteenmäki et al. (2010), Wansink (2003), Saba et al. (2010), and Carrillo et al (2014).
1.4.4.1 Study 1. The aim of this study was to test the assumption that people are indeed using imagery present on product packaging to draw inferences as to a product’s health function. Specifically, this study’s aim was to investigate whether the presence of a functional health image – that is, an image that depicts a specific health function, such as a heart, bone, or brain - on the packaging of fictitious dietary supplement packaging would significantly alter participants’ belief in the accuracy of health claims made for the product, compared with claims made for products that did not carry a function image. Furthermore, it was predicted that participants who use the imagery to draw inferences as to the product’s function would rate as more believable health claims that were congruent with the presented image - for example, the health claim “May help to maintain a healthy heart” when presented alongside an image of a heart - than when the claim was incongruent with the image or the image was absent from the packaging.

1.4.4.2 Study 2. The purpose of Study 2 was twofold. Firstly, this study served to replicate the findings of Study 1 with a sample representative of the ‘average consumer’ as defined by Regulation EC 1924/2006. This was achieved through the use of an online experiment conducted in three European Member states (Italy, Romania, UK). The second aim of this study was to investigate the effect of the functional health images on people’s cognitions for the fictitious dietary supplements. Specifically, it aimed to examine whether the presence of a function image would lead participants to alter their belief as to the potential risks and benefits of consuming the dietary supplement for its intended health purpose. It was hypothesised that the addition of an image on the dietary supplement packaging would act as a health claim and in doing so; ‘promote’ the potential benefits of consuming the product, relative to its potential risks.

1.4.4.3 Study 3. This study aimed to examine whether two general health logos – the Olympic rings logo and the logo for the London 2012 Olympic Games – had the potential to act as health claims when placed on food and beverage products. These logos were designed to communicate the core ideals of the Olympic movement, including health, fitness and wellbeing. It was hypothesised that displaying these logos on the packaging of foods and beverages may communicate a message to the consumer regarding the potential ‘healthfulness’ of the product, and in doing so act as a health claim. The aim of this study was therefore to investigate
whether consumers’ beliefs in products’ healthfulness was influenced by the inferences drawn from the logos displayed on the packaging. This was achieved through the use of an online survey conducted during the period of the London 2012 Olympic Games.

1.4.5 Studies 4-7. The Role of Packaging Imagery on People’s Memory for Product’s Health Function

Studying the memory errors that people generate in certain contexts can offer insight into the beliefs and inferences that those people must have formed, in order for those errors to occur. Studies 4-7 therefore utilise a novel indirect memory-based experimental paradigm to assess how images promote inferences about the health properties of products, and as a means by which to quantify the extent to which specific packaging images may inform or misinform consumers. This methodology goes beyond the reach of the more direct - or explicit - measures used in Studies 1-3 in assessing how consumers interpret health imagery. The paradigm itself involves an encoding and recognition phase. During the encoding phase participants are invited to view fictitious product packaging - that either displays or does not display a function image – together with a series of claims. These claims may be either general in nature or relate to some aspect of the product’s packaging; critically however the claims do not relate to the health function as depicted by the function image. During the recognition phase the participants are again shown the packaging together with a series of claims – some previously seen, others novel, but crucially, they are also shown novel critical claims relating to the function depicted by the image. Participants are required to indicate for each claim whether they have previously seen it for the shown product. If the participants are using the images to draw inferences as to the products health function, recognition errors will likely occur as the images act on our memory to lead participants to incorrectly believe that they previously saw the critical claims during the encoding phase.

1.4.5.1 Study 4. The aim of Study 4 was to apply a novel indirect memory-based methodology to assess how images present on product packaging – in this instance, fictitious dietary supplement packaging - influenced the inferences people drew as to the potential health properties of those products. Specifically, this study aimed to investigate whether the presence of functional health images on fictitious
dietary supplement packaging influenced the production of recognition errors made by the viewers for previously unseen novel health claims. That is to say, if the presence of the function images on dietary supplement packaging lead participants to – deliberately or spontaneously – make health-related inferences, the participants would falsely recognise previously unseen claims that relate to these inferences.

1.4.5.2 Study 5. The purpose of Study 5 was twofold. Firstly, this study aimed to test the replicability of the findings of Study 4. Secondly, it aimed to address the question of whether the observed recognition errors were the result of a controlled and deliberate cognitive process, or automatic and spontaneous inferences. This was achieved by examining the extent to which forewarning participants – that is, instructing them to avoid being influenced by the function images – would assist them in avoiding these recognition errors. It was hypothesised that if participants were spontaneously using the images on the products’ packaging to infer the product’s function then the addition of a warning would have little, if any, effect on the number of recognition errors they made. However, if participants were utilising a more controlled and deliberate cognitive process, then they should be able to act on the information given in the forewarning and avoid making such recognition errors.

1.4.5.3 Study 6. Product packaging often carries both function images and text-based health claims (Moskowitz, Reisner, Lawlor, & Deliza, 2009). The purpose of Study 6 was therefore to gain a better understanding of how these two packaging elements interact to potentially influence consumer understanding. Specifically, this study aimed to examine whether the congruence of the function image and text-based health claim displayed on the fictitious dietary supplement packaging would influence the production of recognition errors made by the participant for novel – previously unseen – health claims. It was predicted that recognition errors for novel health claims would be greatest when a function image was present on the product’s packaging in addition to the health claim, and these two elements were congruent with regards to function; for example, both elements related to heart health.

1.4.5.4 Study 7. My previous three studies – Studies 4, 5 and 6 – utilised a novel indirect memory-based methodology. Specifically, these three studies examined the occurrence of recognition errors. The aim of Study 7 was to expand the methodology to include a free recall task. This study therefore aimed to examine
the role of function images on participants’ free recall for previously seen claims. A further aim of this study was to compare the effect of function images on participants’ recognition and free recall for different types of claims, namely, nutrition claims, health claims, and generic claims. It was hypothesised that the addition of a function image would have the effect of promoting nutrition claims to health claims in people’s memories. That is to say, it was predicted that a function image – such as a heart – when paired with a nutrition claim, would cause people to produce a false memory of having seen a health claim relating to heart function, and this would be reflected by their responses in the free recall and recognition tasks. Finally, this study aimed to test participants representative of the ‘average consumer’ in the five European countries studied, as the legislation states that nutrition and health claims should be understandable to this group.

1.4.6 Section Summary

Legislation in many countries, including the UK, specifies that images on food packaging can qualify as health claims (EC, 2006). However, this legislation assumes that imagery can lead people to infer health benefits of products. Furthermore, this legislation – designed to protect consumers – is weakened by the subjective nature of images. Which images constitute health claims and which do not? To answer this question, one needs to know which images routinely lead consumers to make health-related inferences. The new research presented in this thesis aimed to examine the role of packaging imagery in people’s understanding of product’s health functions. Firstly, Studies 1-3 aimed to test the assumption that images can constitute health claims through the use of direct reporting methods to examine the influence of packaging imagery on people’s beliefs as to the health properties of food and dietary supplement products. A novel indirect memory-based methodology is then used in Studies 4-7 to assess how images promote health-related inferences and to quantify the extent to which packaging imagery may inform or misinform the consumer.
CHAPTER TWO

STUDY 1: Investigating the Effects of Function Images on People’s Beliefs About the Health Claims of Dietary Supplements.

2.1 Chapter Overview

The literature reviewed in Chapter One suggests that consumers might use visual information displayed on product packaging to draw inferences about the product’s function. The current chapter details a computer-based laboratory experiment intended as a manipulation check to determine whether people do indeed use the imagery present on product packaging to draw inferences as to the product’s health function.

2.2 Introduction

The literature has suggested that consumers may be drawing inferences as to a product’s function, from the visual information displayed on its packaging. That is to say, the literature is suggesting that visual images can act as health claims in a similar way to text-based information, insofar as they may prime consumers’ expectations as to a products’ health benefit. This notion is in keeping with current EC legislation on the use of health claims, which applies equally to text and images, as it assumes that an image, symbol or graphic can in itself be a health claim (EC, 2006, Art 2.2.2). In addition, research - such as that by Carrillo et al. (2014), and Saba et al. (2010) - indicates that displaying images depicting a specific health outcome on a product’s packaging can affect people’s beliefs about the health properties of a product. Such findings suggest that specific health images – or ‘health function images’ – here after known simply as ‘function images’ - displayed on product packaging can communicate with consumers in a similar way to written health claims and thus act as a ‘visual health claim’ in their own right. Research in this area is however sparse and before further research is conducted it is important to test this underlying assumption. That is, do consumers – consciously or unconsciously – derive health related information from the images displayed on product packaging?
2.3 Aims

The aim of this first study was therefore to test the assumption that the presence of a function image on product packaging – in this instance, the packaging of fictitious dietary supplements – will lead people to draw inferences as to that product’s supposed health function. Participants will be required to view product packaging with either a function image present or absent and to make belief ratings for accompanying health claims. It is hypothesised that accompanying claims congruent with the function image presented on the product packaging will receive higher believability ratings, than those presented with either an incongruent image or no image at all. Put simply, it is predicted that a health claim about, say, a ‘healthy heart’ shown in conjunction with packaging carrying an image of a heart will be rated as more believable compared to when that same packaging does not display a heart image.

A further aim of this study was to determine whether the function images – representing each of the six health categories – lead participants to draw inferences as to products’ function in a similar way. No significant effect of type of function image is predicted, that is, whether the function image is of a heart or a bone, should not significantly affect participants’ belief ratings for congruent health claims.

The final aim of this study was to explore participants’ response time data – that is, the time it took the participant to make each of their belief ratings. It was anticipated that this data would offer an insight into the nature of the participants’ decision-making process. That is, whether the participants were consciously and deliberately considering the function images, or forming judgements spontaneously and outside of their conscious awareness. Due to the lack of prior research in this area, no formal prediction is made for this data.
METHOD

2.4 Participants
Twenty-six undergraduate students at a UK university took part in this experiment, either in exchange for course credit or without compensation. One participant was eliminated from the final data analysis as they failed to correctly understand the task. The remaining 25 participants were made up of 23 females and 2 males and had an average age of 19.4 years (SD = 1.13, Range = 18 - 22).

2.5 Design
This study took the form of a single-session laboratory experiment of approximately 30 minutes duration. The Psychology Software Programme E-Prime™ was used both to display the stimulus material and for data collection. The experiment followed a 2 (Health Image: Present vs. Absent) x 2 (Written Claim: Congruent vs. Incongruent) repeated-measures design. The dependent variable was the mean belief ratings for the congruent and incongruent written claims. Response time data was also collected.

2.6 Materials
In this study, participants were required to view a series of fictitious dietary supplement packages presented alongside written health claims. Participants were required to indicate - through the use of a Likert scale - the degree to which they believed the health claim to be true or false in relation to the dietary supplement packaging. To this end, a stimulus set of fictitious dietary supplement packaging and written health claims were created.

2.6.1 Dietary supplement packaging. The decision was made that while the dietary supplement packaging should represent fictitious products, the target images themselves should be from genuine dietary supplement packaging. This allowed for the testing of function images currently in the marketplace, while at the same time eliminating bias arising from previous product exposure. Consequently, digital images of genuine dietary supplement packaging were obtained for products representing six health categories (women’s health, memory and cognitive function, sleep, bones and joints, colds and flu, heart function). These products were available
for sale, but not widely advertised, at UK supermarkets and high-street chemists (Boots, Superdrug, Holland & Barrett, ASDA, Sainsbury’s and Tesco). These digital images were then assessed for possible inclusion and with the aim of selecting a single representative image for each of the six health categories. The criteria for inclusion were as follows; [1] the image had to be representative of a specific health function (e.g., heart function), not an ingredient; [2] the image had to ‘stand alone’, that is it could be isolated from the rest of the information on the product packaging and still be understood as representing a specific health function; [3] providing the first two criteria were met, all types of image were considered for inclusion (i.e. photographs, illustrations, symbols, coloured, black & white etc.).

The selected images were isolated from their original packaging using the graphic editing software Adobe Photoshop Elements™ and placed onto the six fictitious dietary supplement packages. The fictitious packaging was standardised in terms of size and content, and were designed to resemble actual dietary supplement packaging. This meant that each package was comprised of a fictitious brand name, a visually appealing design, a brief description of the active ingredient, some other peripheral text (e.g., the number of capsules inside the package), and some generic symbols (e.g., a manufacturer’s logo). The resulting product packages that comprise the ‘function image-present’ condition can be seen in Figure 1. Additionally, for each stimulus package a second version was created. This version was the same in all respects to the first with the exception of the health function image isolated from the original packaging. That is to say, two different versions of each packet were created, one with the health function image present (the image-present packages), and one with the health function image absent (the image-absent packages). The image-absent packages can be viewed in Figure 2.

2.6.2 Written health claims. For each of the six fictional products, a stimulus set of eight written claims was created. Four of these claims made direct reference to the health function implied by the image on the image-present packages (e.g., “May help to maintain a healthy heart”); these are referred to as ‘congruent claims’. The remaining four written claims were ‘incongruent claims’. These were general health claims that made no direct reference to the health function implied by the image or the packaging itself (e.g., “Specifically formulated for men aged 18-40yrs”). All the claims were based upon those found on the packaging of genuine
Figure 1. Fictitious dietary supplement packaging from the ‘image-present’ condition. Image (a) represents the health category ‘memory & cognitive function’; image (b) represents the health category ‘bones & joints’; image (c) represents ‘women’s health’; image (d) represents ‘sleep’; image(e) represents ‘colds & flu’; and image (f) represents ‘heart function’.

Figure 2. Fictitious dietary supplement packaging from the ‘image-absent’ condition.
dietary supplements, but adapted to ensure approximate consistency in terms of the number of words per claim. A full list of the written claims used in this study can be found in Appendix C.

2.7 Procedure

Participants sat at a computer for the entirety of the experimental session, and after consenting received written instructions on the screen (See Appendix A for participant consent form). The participants were tasked with viewing the fictitious packaging, which appeared sequentially and in random order, together with a written health claim on the screen. Participants were instructed to read the health claim and consider it in relation to the packaging, before indicating via the onscreen Likert scale, the degree to which they believed the claim to be true or false (See Figure 3). A score of one on the Likert scale indicated a belief of ‘entirely false’, whereas a score of seven on the scale indicated a belief of ‘entirely true’. If the participant believed the claim to be neither true nor false then they were to indicate this by selecting four on the scale. The twelve fictitious product packages (6 x image-present packages; 6 x image-absent packages) were each viewed 4 times by the participants during the experiment. On half the viewings the product packaging was presented with a congruent claim, and for the remaining viewings it was presented with an incongruent claim. Thus participants viewed 48 packaging + claim stimuli pairings in the following combinations:

- 12 x image-present + congruent claim
- 12 x image absent + congruent claim
- 12 x image-present + incongruent claim
- 12 x image absent+ incongruent claim

Finally, participants recorded their age and gender before being thanked and debriefed (See Appendix B for participant debriefing sheet).

2.8 Ethics

This study received a favourable opinion from the University of Surrey Ethic Committee. Confirmation of this can be found in Appendix D.
May help to maintain a healthy heart

On the scale below, please indicate the degree to which you believe the above claim to be true or false.

Entirely False 1 2 3 4 5 6 7 Entirely True

Figure 3. Screenshot illustrating the experimental procedure for Study 1. This exemplar shows an image-present/congruent claim pairing.
RESULTS

2.9 Data Analysis

Participant responses were collected using the Psychology Software Programme, E-Prime™ and analysed using SPSS version 20 (IMB Corp., 2011).

Data were analysed in the following ways.

(i) Participants’ mean belief ratings for written health claims were compared between conditions using a two-way (Function Image vs. Written Health Claim) repeated-measures analysis of variance (ANOVA).

(ii) To examine whether participants’ mean belief ratings for written health claims differed significantly across the six health categories, a three-way (Function Image vs. Written Health Claim vs. Health Category) repeated-measures ANOVA was conducted.

(iii) A series of two-way (Function Image vs. Written Health Claim) repeated-measures ANOVAs were performed for each of the six health categories to further investigate interactions.

(iv) Participants’ response time data was examined using a two-way (Function Image vs. Written Health Claim) repeated-measures ANOVA. Post-hoc paired sample t-tests were performed.

2.10 Mean Belief Ratings for Written Health Claims

This study aimed to investigate whether the presence of function images on fictitious dietary supplement packaging would significantly alter participants’ belief in the accuracy of accompanying written health claims. To this end, a 2(Function Image: Present vs. Absent) x 2(Written Health Claim: Congruent vs. Incongruent) repeated-measures analysis of variance (ANOVA) was calculated for participants’ belief ratings. The results of this analysis reveal a significant main effect for both function image ($F[1, 24] = 6.89, p = .02, \eta^2_p = .22$), and written health claim ($F[1, 24] = 98.91, p < .01, \eta^2_p = .81$). Furthermore, a significant interaction was found between the two conditions, ($F[1, 24] = 52.64, p < .01, \eta^2_p = .69$).
Post-hoc paired sample $t$-tests suggest that when a function image is present on the dietary supplement packaging, congruent written health claims are significantly more likely to be rated as believable than when the function image is absent, ($t[24] = -7.06, p < .01, r = .82$). Furthermore, when the function image is present incongruent health claims were found to be rated as significantly less believable by participants than incongruent health claims rated when the image was absent, ($t[24] = 5.33, p < .01, r = .74$). This can be more clearly seen in Figure 4.

![Figure 4](image-url)  

*Figure 4.* Mean belief ratings for congruent and incongruent claims when the function images on the dietary supplement packaging are present and absent.

### 2.11 Mean Belief Ratings Analysed by Health Category

The data were further analysed to compare participants’ belief ratings across the six health categories (women’s health, memory and cognitive function, mood and sleep, bones and joints, colds and flu, heart function). The results of ANOVA suggest there to be a significant main effect of health category on participant’s belief ratings for written health claims, ($F[5, 120] = 6.53, p < .01, \eta^2_p = .21$) that is, participants expressed different levels of overall belief in the health claims dependent on which product they saw. Furthermore, significant two-way interactions were found between both health category and written health claims, ($F[5, 120] = 12.53, p < .01, \eta^2_p = .34$) and health category and function image ($F[5, 120] = 11.60, p < .01$, ...
Finally, a significant three-way interaction (Health Category x Written Health Claim x Function Image) was also revealed, \( F[5, 120] = 7.73, p < .01, \eta^2_p = .24 \).

To explore this three-way interaction further, a series of two-way ANOVAs were conducted, one for each of the six health categories. These tests revealed a significant two-way interaction between function images and written health claims for five of the six health categories. A significant interaction was found for sleep, \( F[1, 24] = 71.02, p < .01, \eta^2_p = .75 \) for memory, \( F[1, 24] = 13.39, p = .01, \eta^2_p = .36 \) for bones, \( F[1, 24] = 35.49, p < .01, \eta^2_p = .60 \) for heart, \( F[1, 24] = 4.26, p = .05, \eta^2_p = .15 \), and for cold, \( F[1, 24] = 28.38, p < .01, \eta^2_p = .54 \). However, no significant interaction was found between written health claims and the function image for the women’s health condition, \( F[1, 24] = 0.36, p = .56, \eta^2_p = .02 \). This suggests that five of the six function images successfully primed participants’ expectations as to the products’ function. These interactions can be seen in Figure 5.

### 2.11.1 Sleep

Post-hoc paired sample t-tests revealed that when the function image representing the health category ‘sleep’ was present on the packaging, participants rated congruent health claims – that is, written health claims relating to sleep – as significantly more believable compared to when that same function image was absent from the packaging, \( M_{\text{present}} = 5.7, SD = 0.72; M_{\text{absent}} = 4.22, SD = 1.39; t[24] = 4.86, p < .01, r = .70 \). However, the reverse was found when the written health claim and function image were incongruent. That is to say, participants’ belief ratings for incongruent health claims were significantly lower when the function image was present on the product packaging, than when it was absent, \( M_{\text{present}} = 1.96, SD = 0.91; M_{\text{absent}} = 3.78, SD = 1.19; t[24] = -7.05, p < .01, r = .82 \). Furthermore, the analysis revealed a significant difference in participants’ belief ratings for sleep claims when the function image was present on the product packaging, \( t[24] = 13.80, p < .01, r = .94 \). However, no such difference in participants’ belief ratings was found when the function image was absent, \( t[24] = 1.38, p = .18, r = .27 \).

### 2.11.2 Memory & cognitive function

When the function image displayed on the dietary supplement packaging related to ‘memory and cognitive function’, the post-hoc analysis indicated that participants’ rated congruent health claims as
significantly more believable when the function image was present on the product packaging, than when it was absent, \( (M_{\text{present}} = 4.58, SD = 1.59; M_{\text{absent}} = 2.74, SD = 1.14; t[24] = 5.58, p < .01, r = .75) \). However, function image had no significant effect on participants’ belief ratings for incongruent health claims, \( (M_{\text{present}} = 3.34, SD = 1.04; M_{\text{absent}} = 3.44, SD = 1.29, t[24] = -.269, p = .790, r = .05) \). In addition, the analysis revealed there to be a significant difference in participants’ belief ratings for memory claims both when the function image was present, \( (t[24] = 3.23, p = .004, r = .55) \) and when it was absent from the product packaging, \( (t[24] = -2.13, p = .044, r = .40) \).

2.11.3 Bones & joints. The post-hoc analysis for the health category of ‘bones and joints’ revealed that participants rated congruent written claims as significantly more believable when the function image was present on the product packaging, than when it was absent, \( (M_{\text{present}} = 5.68, SD = 1.16; M_{\text{absent}} = 4.06, SD = 1.31; t[24] = 5.07, p < .01, r = .72) \). However, the analysis suggested that the opposite was true for participants’ belief ratings of incongruent health claims. In this instance, participants rated the incongruent written health claims as more believable when the function image was absent from the product packaging, compared to when it was present on the packaging, \( (M_{\text{present}} = 2.16, SD = 0.95; M_{\text{absent}} = 3.36, SD = 1.27; t[24] = -4.18, p < .01, r = .65) \). The analysis additionally revealed there to be a significant difference in participants’ ratings for bone and joint claims both when the function image was present on the product packaging, \( (t[24] = 10.71, p < .01, r = .90) \) and when it was absent, \( (t[24] = 2.05, p = .052, r = .39) \).

2.11.4 Heart. The post-hoc analysis for the function image related to the health category ‘heart’, suggested that participants’ belief ratings for congruent written health claims was not affected by function image. That is to say, there was no significant difference between participants’ belief ratings for congruent health claims when the function image was present and when it was absent from the product packaging, \( (M_{\text{present}} = 4.18, SD = 1.53; M_{\text{absent}} = 3.92, SD = 1.53; t[24] = .750, p = .460, r = .15) \). However, incongruent written health claims were rated by the participants as significantly more believable when the function image was absent, than when it was present on the product packaging, \( (M_{\text{absent}} = 2.82, SD = 1.38; M_{\text{present}} = 2.02, SD = 0.93; t[24] = -3.44, p = .002, r = .57) \). In addition, the analysis revealed a significant difference between participants’ belief ratings for heart health
claims when the function image was present, ($t[24] = 6.90, p < .01, r = .82$). This effect was also seen when the function image was absent from the product packaging, ($t[24] = 2.68, p = .01, r = .48$).

### 2.11.5 Colds & flu

For the health category of ‘Colds & Flu’, post-hoc analysis revealed that participants’ rated congruent written health claims as significantly more believable when the function image was present on the product packaging than when it was absent, ($M_{\text{present}} = 5.44, SD = 1.21; M_{\text{absent}} = 3.14, SD = 1.18; t[24] = 7.13, p < .001, r = .82$). However, no such effect of function image was found for participant ratings of incongruent health claims, ($M_{\text{present}} = 3.06, SD = 0.94; M_{\text{absent}} = 3.12, SD = 1.05; t[24] = -.27, p = .79, r = .05$). The analysis also revealed a significant difference in participants’ belief ratings when the function image was present on the product packaging, ($t[24] = 7.11, p < .001, r = .82$). However, no such effect was seen when the function image was absent, ($t[24] = .08, p = .94, r = .02$).

### 2.11.6 Women’s health

The post-hoc analysis for the function image representing the health category ‘women’s health’, indicated that participants’ belief ratings for congruent written health claims was not significantly influenced by function image, ($M_{\text{present}} = 4.24, SD = 1.44; M_{\text{absent}} = 4.52, SD = 1.19; t[24] = -1.05, p = .30, r = -.11$). Participants’ belief ratings for incongruent health claims was also found not to be significantly influenced by function image, ($M_{\text{present}} = 3.46, SD = 1.27; M_{\text{absent}} = 4.00, SD = 0.78; t[24] = -1.84, p = .08, r = -0.25$). However, the analysis did reveal a significant difference in participants’ belief ratings for women’s health claims when the function image was present on the products packaging, ($t[24] = 2.29, p = .031, r = .28$). However, no such effect was found when the function image was absent ($t[24] = 1.66, p = .111, r = .25$).

### 2.12 Response Times for Written Health Claims

Response time data was collected for participants’ belief ratings of the written health claims. It was anticipated that response times would provide an indication as to whether participants were arriving at their judgements as part of an implicit or explicit decision-making process. That is, were the participants’ consciously and deliberately considering the function images, or were these judgements formed spontaneously and outside of the participant’s conscious awareness. To investigate this further, a 2(Function Image: Present vs. Absent) x
Figure 5. Mean belief ratings for congruent and incongruent claims when the function image on dietary supplement packaging is present and absent for the health categories; (a.) sleep, (b.) memory & cognitive function, (c.) bones & joints, (d.) heart function, (e.) Cold & Flu and (f.) women’s health.
2(Written Health Claim: Congruent vs. Incongruent) repeated-measures ANOVA was used to analyse this data. The results of this analysis suggest that there was a significant main effect of health claim on participants’ response times, \( (F[1, 24] = 6.11, p = .02, \eta^2_p = .20) \). A significant main effect of function image, \( (F[1, 24] = 8.28, p = .008, \eta^2_p = .26) \) was also found. The interaction between health claims and function image was also significant, \( (F[1, 24] = 130.72, p < .01, \eta^2_p = .85) \). To further investigate this interaction, post-hoc paired sample t-tests were performed. Participants’ response times for congruent health claims were significantly quicker when the function image was absent from the product packaging (\( M = 5882.40, SD = 1813.33 \)), compared to when the function image was present, (\( M = 7000.83, SD = 1846.59, t[24] = -4.75, p < .001, r = .70 \)). This finding suggests that participants are using the function images to inform their judgements. That is, participants were taking longer to arrive at their decision when a function image was present. For incongruent health claims the reverse was found. That is, when the function image present on the product packaging was incongruent with the accompanying written health claims, participants were arriving at their judgements faster compared to when that function image was absent from the product packaging, (\( M_{\text{present}} = 5846.93, SD= 1663.98; M_{\text{absent}} = 8018.71, SD = 2167.48; t[24] = 9.44, p < .01, r = .90 \)). This effect can be seen clearly in Figure 6.

![Figure 6: Mean response time for congruent and incongruent claims when function images on the dietary supplement package are present and absent.](image-url)
The aim of this study was to test the assumption that people are indeed using the visual images displayed on product packaging to draw inferences as to their product’s health function. The data indicate that this is indeed the case. Specifically, the results suggest that when the function image present on the fictitious dietary supplement packaging was congruent with the written health claim, participants rated these health claims as more believable compared to when that function image was either absent, or present but incongruent. This outcome is in accordance with the findings from the small body of previous research that suggests that images can act as health claims, insofar as they can prime consumers’ expectations as to the products function (e.g., Carrillo et al. 2014, Saba et al. 2010). These findings also affirm the assumption in current EC legislation that assumes that images displayed on product packaging can lead consumers to make health-related inferences about the product inside the packaging (EC, 2006, Art 2.2.2). Furthermore, this finding was seen across five of the six health categories tested in this experiment, suggesting that such an effect is not restricted to a particular type of function image or dietary supplement. The comparison of the response time data indicates that participants took longer to make their decision about the accuracy of the accompanying health claim when a congruent function image was present on the product packaging. However, the opposite effect was found for participants’ response times when the function image and health claim were incongruent, that is they implied different health functions. In this instance, participants’ responses were more rapid compared to when the function image was either incongruent with the health claim or absent from the packaging. These findings can be explained, in part, by theories of heuristic reasoning. For example, the function image on the product packaging may act to evoke existing schemas against which product information – in this case, the health claims – can be evaluated. Furthermore, information that is consistent with the evoked schema induces positive affect in the viewer, a phenomena known as the Schema Congruity Effect (Mandler, 1982, Flaherty & Mowen, 2010). Thus higher belief ratings are given to health claims that are congruent with the function image. Put simply, if the function image displayed on the product packaging were of a heart, schemas concerning heart function would be evoked. Thus when the heart image is
seen alongside a health claim that also related to heart function, positive affect results, leading the participant to rate the health claim as more believable. The more rapid response times for incongruent claims can thus be explained by the limited need to evaluate the health claim against the schema. That is to say, after the initial evaluation of incongruity, little further evaluation is required in order for the participant to formulate a belief judgement. The findings of this study are also in accordance with those of previous research that suggests consumers have a more favourable perception of product packaging displaying congruent elements (e.g., Childers & Jass, 2002, Garrestson & Burton, 2000, Kozup, Creyer, & Burton, 2003, Peracchio & Meyers-Levy, 2005, Van Rompay et al. 2009, 2010, Van Rompay & Pruyn, 2008).

2.13 Methodological Limitations

Although the findings of this study lend support to the notion that images can act as health claims, these findings should however be viewed within the limitations of this experimental design. This study was designed as a manipulation check to test the assumption that people are using visual imagery on product packaging to draw inferences as to its health function. Thus a laboratory-based experiment was deemed adequate for this purpose, as was the use of a student sample. However, both are limiting if one wishes to answer wider questions on the role of packaging imagery in consumers’ understanding of health information. For this it is essential that data from a more diverse and representative sample be gathered. The current sample however, was not fully without merit. For although the student sample had limited consumer experience with the product category – in this case, dietary supplements – this could equally be construed as a benefit. For example, bias from prior experience with this product type was limited, as was the motivation to purchase these products for a specific health function. However, this sample of ‘consumers’ cannot be realistically interpreted as ‘average consumers’, an important consideration given that the legislation states that the health benefits of food be both scientifically substantiated and understandable to the ‘average consumer’ (EC, 2006). A further limitation of this study relates to the category of product – dietary supplements – selected for use as a stimulus material. The current legislation covers the use of
health claims on foods, beverages and dietary supplements, thus it would be prudent to explore the effect of imagery on these other product categories as well – a task that is addressed in Studies 3 and 7. In addition, this study replicates the methodology of previous research insofar as it uses a ‘direct measure’ of consumer understanding. However, as discussed in Chapter One, such measures are not without their limitations, particularly in regards to determining whether any consumer inferences are the result of implicit or explicit decision-making. This issue will be explored further in Studies 4, 5, 6 and 7. Finally, this study measured participants’ belief as to a product’s function. That is, how true or false they perceived the health claim to be in relation to the product. These findings therefore tell us little of people’s judgements for the potential risk and benefits of consuming these products; an issue that surely warrants further study.

2.14 Conclusion

To conclude, the findings from this study suggest that function images present on product packaging can act as health claims, and in doing so, supports both the assertion made in current EC legislation (EC, 2006), and the small body of evidence which suggest that images can act as health claims insofar as they prime consumers expectations as to a product’s health function (e.g., Carrillo et al., 2014, Saba et al., 2010). However, further study is needed to more fully explore the influence of such imagery on people’s understanding of health information. To this end, Study 2 will aim to both replicate the current findings and expand on them by investigating the effect of inferences on people’s perception as to the risks and benefits of consuming a product.
CHAPTER THREE

STUDY 2: Packaging Imagery Influences People’s Appraisal of Products’ Health Risks and Benefits.

3.1 Chapter Overview

The data from Study 1 affirm that people use images on product packaging – specifically, function images on fictitious dietary supplement packaging – to draw inferences as to the product’s purported health function. Furthermore, these data suggest that viewers’ belief in these inferences increases when the image present on the product’s packaging is congruent to the accompanying written health claim. However, it is currently unclear as to how such inferences may act to influence people’s judgements, when they also receive more overt – and potentially conflicting – written information as to a product’s health function. The current study aims to investigate this issue, by asking whether function images on products’ packaging shape people’s appraisal of the potential risks and benefits of consuming the product. This will be achieved through the use of an international online study conducted in three European countries.

3.2 Communicating Risk and Benefit

Effective communication of the potential risks and benefits associated with consuming a product, such as a dietary supplement, is essential in allowing the consumer to fully understand the product’s purpose in relation to their health. Dietary supplements are subject to the same provision in law as food, namely regulation 1924/2006/EC on nutrition and health claims made on foods. Therefore, any claim made relating to a dietary supplement’s role in health maintenance, health optimisation and/or disease risk reduction – in other words, the product’s potential benefits - should therefore be capable of substantiation, based on generally accepted scientific evidence and be understandable to the average consumer. By contrast, there are no such regulations on communicating the potential risks associated with consuming such products. An exception to this being foods carrying certain ingredients, such as Aspartame, that are required to carry an advisory statement (i.e., Contains a source of phenylalanine) on their packaging (Department for
Environment, Food & Rural Affairs, 2015). This disparity in regulating the communication of risks and benefits has the potential to lead to confusion among consumers. For example, the lack of a health claim on a food or dietary supplement product does not prevent the product from being marketed, nor does the absence of a claim necessarily mean that there is an absence of benefit. Furthermore, there is an inherent trust that exists amongst consumers that products available for sale in the marketplace are ‘safe’ for human consumption (Hunt & Frewer, 2001). Indeed, there is a strong correlation between high consumer trust in an organisation and low perceived risk, and vice versa (EUFIC, 2003). A further disparity also exists between the positioning of risk and benefit information on a product’s packaging. That is to say, information relating to a product’s potential health benefits often appears as front-of-pack information, as such benefits are used by manufacturers and marketers to assist in the promotion and sale of the product. By contrast risk information often appears either on the back-of-pack, or as part of an in-pack information leaflet, requiring a motivated search for information on the part of the consumer.

3.3 The Relationship Between Risk and Benefit

Models of health communication and decision-making have identified various mental strategies – or heuristics – that people use when assessing potential risks and/or benefits to their health. Such models indicate a linear relationship between factors, for example a person’s perception as to the severity of a health risk, their acknowledgement that they are personally at risk; and their likelihood of engaging in risk reducing or preventing behaviours (Berry, 2004). For instance, the Health Belief Model (HBM; Rosenstock et al., 1994) assumes that a person holds the desire to avoid illness and/or get well; along with the belief that specific available health actions – such as taking a dietary supplement – would prevent illness or reduce symptoms. A person’s appraisal of risk is based on their personal susceptibility to – and the severity of – an illness, as well as the likelihood of being able to reduce the threat through their behaviour. Any anticipated barriers (or risks) associated with the behaviour, such as any side-effects of taking a dietary supplement, must be outweighed by the potential benefits, such as the protection from the onset of symptoms. Similarly, the Protection-Motivation Theory (PMT)
formulated by Rogers (1975) combines the notion of ‘fear-appraisal’ with an expectancy-value approach to attitude and behaviour. This theory suggests that a person derives information about a potential health risk through various environmental sources – such as information on dietary supplement packaging or in the media, but also through their own prior experiences with the potential risk factor – before initiating a cognitive appraisal of the potential threat. Models such as these may explain why those diagnosed with, or who are at risk from a disease, have a greater tendency to seek out and make use of the information available to them. For example, a study by Cook, Burton, and Howlett (2011) found participants diagnosed with either high cholesterol or hypertension to be the greatest users of nutrient information on food and beverage packaging. In addition, they found morbidity status influences a person’s tendency to attend to specific information. That is, those with hypertension consistently made more references to sodium information, whereas those with high cholesterol were found to attend more to fat information.

Models of health decision-making and behaviour, such as those mentioned above have tended to treat risk and benefit as distinct concepts (Berry, 2004). However, empirical studies have consistently observed an inverse relationship between perceived risk and perceived benefit. That is, behaviours that were judged by people to be high in risk also were judged as low in benefit and vice versa (e.g., Fischhoff, Slovic, Lichtenstein, Read, & Combs, 1978, Slovic, Flynn, & Layman, 1991). Furthermore, Alhakami and Slovic (1994) argued that the inverse relationship between perceived risk and perceived benefit is indicative of a confounding of risk and benefit in people’s minds. They suggest that people based their judgements not only on what they think, but also on how they feel. Finucane, Alhakami, Slovic, and Johnson (2000) expand on this notion by suggesting that although analysis is important in some decision-making processes, reliance on affect and emotion is quicker, easier and more effective than weighing-up the pros and cons of the individual options. They went on to propose that this inverse relationship occurs because people use an ‘affect heuristic’ when making specific risk-benefit judgments. That is to say, people draw on their stored representations - or schemas – for associated objects and events and these representations are ‘tagged’ with affect. This is consistent with a body of research that conceptualises people’s risk
judgements as an intuitive – rather than analytical – process with an emphasis on feelings (e.g., Slovic, Finucance, Peters, & MacGregor, 2004).

This notion of risk as a feeling is somewhat similar to those arising from Processing Fluency theory, another type of heuristic reasoning which was discussed in Chapter One. In this theory it is the subjective experience of ease-of-processing that fosters an erroneous feeling of familiarity, which in turn leads to feelings of positive affect towards the stimulus, and a strong feeling of knowing (e.g., Koriat & Levy – Sadot, 2001). Therefore it should be concluded that if apparent familiarity of a stimulus plays a role in the judgement of potential risk and benefit, novel stimuli should be perceived as less ‘risky’ when they are easy to process, or fluent. For example, Song, and Schwarz (2009) found that ostensible food additives were rated as more harmful when their names were difficult, rather than easy, to pronounce. In a similar study that found that participants given an amusement park brochure listing the names of rides, rated rides with difficult-to-pronounce names as risker than rides with easy-too pronounce names, again suggesting that fluency influences perception of risk (Song & Schwarz, 2009).

Finally, people often experience difficulties when attempting to weigh-up the relative risks and benefits associated with particular health behaviours. For example, Edwards, Wiholm, and Martinez (1996) suggested that the risks associated with taking a particular medicine are typically of a completely different nature, form and frequency compared with the benefits. They went on to say that, most individuals seek a single benefit from taking a medicine, that is the reduction, management or prevention of symptoms, yet the potential risks are often multiple. Within the food domain, consumers often encounter situations where a single behaviour can produce two conflicting outcome messages. For example, consumers might receive a message that eating red meat can carry health benefits relating to an increased intake of protein, minerals and vitamins, however they may also receive a conflicting message that the consumption of red meat also increases the risk of heart disease and cancer among consumers (Regan et al., 2014). These conflicting messages may result in feelings of uncertainty and ambiguity as regards to the best choice of health behaviour (Nagler, 2014). Furthermore, these conflicting messages present a significant challenge for those charged with ensuring consumers are fully informed.
when it comes to making decisions relating to their dietary health (Regan et al., 2014).

3.4 Risk and Benefit Images

Studies have shown that images can act to elevate a person’s perception of risk for various threats to their health. For example, adding images to newspaper stories about health threats has been found to significantly increase a person’s perception of risk for melanomas (Zillmann & Gan, 1996) and tick-borne disease (Gibson & Zillmann, 2000). An explanation for this being that people are inclined to trust images – and in particular, photographs – as credible sources of information (Kelly & Nace, 1994). Even if the image does not provide direct evidence to support the information or claim, its mere presence is nevertheless enough to boost people’s belief in the information and consider that information as more truthful (Newman et al., 2012). This would suggest that the presence of an image on a product’s packaging would act to inflate people’s beliefs in the accompanying health information – as was found in Study 1. However, it is as yet unclear how such a phenomena would work if the presented information were conflicting risk - benefit information.

A product’s packaging is an important means by which marketers and advertisers communicate with consumers at the point-of-sale (Underwood, 2003), and as such it would be counterintuitive to display negative or warning imagery on front-of-pack. By contrast seemingly innocuous and decorative pictures, graphics and symbols are often seen on a product’s packaging. In addition, there are several examples of imagery placed directly on pack as a means to communicate the potential benefits of a product to the consumer. Some examples of such imagery include logos denoting a product as being a ‘healthy choice’; these include the Smart Choices logo (Lupton et al., 2010), the Swedish Keyhole (Larsson, Lissner, & Wilhelmsen, 1999) and the Healthy Choices ‘Checkmark’ (Dotsch – Klerk & Jansen, 2008). Other similar logos include those from endorsing charities, such as the British Dental Health Foundation approved logo (British Dental Foundation, 2015). The presence of such endorsements on product packaging has been found to create a ‘feel-good factor’ amongst consumers who were generally reassured that the product was ‘healthy’ as they held the assumption that the product had been checked or
tested by a reputable charity (Forum Qualitative, 2003). However, the same report also stated that the presence of such endorsements have the potential to mislead consumers as to a product’s superiority and healthiness (Forum Qualitative, 2003), although this remains to be tested experimentally.

It can be said that an example of front-of-pack imagery in which both risk and benefit information is depicted together is the ‘traffic light schemes’ nutritional fact panel (FSA, 2007). This panel displays the product’s key nutritional information – that is, fat, saturated fat, sugar and salt - along with red, amber, green traffic light colour coding, as well as the percentage of guideline daily amounts (GDA; Aschemann – Witzel et al., 2013). Results from the use of this nutritional fact panel suggest that it is persuasive in promoting healthy food choice (Aschemann-Witzel et al., 2013) although the relationship between such visual information and people’s perceptions of the potential risks and benefits associated with consuming the product again remains unclear.

3.5 Aims

This study firstly aimed to test the reliability of the findings from Study 1. This is the finding that people use function images present on the packaging of fictitious dietary supplement packaging to draw inferences as to the product’s proposed function, and that the presence of such function images will act to inflate peoples’ belief ratings for accompanying congruent written health claims. This finding will be expanded upon through the use of a more diverse and representative participant sample than the university student only sample of Study 1. This is necessary as current EC legislation requires health claims to be “…understandable to the average consumer” (EC, 2006, Art. 2.5). To this end, data will be collected from a sample of Community members from three European countries (Italy, Romania, UK) and across a range of ages, occupations and educational levels. However, due to the nature of the legislation – set at Community rather than National level - no significant differences in participants’ belief ratings are predicted between countries.

This study further aims to expand on the work of the previous study by investigating whether function images on product packaging – specifically, fictional dietary supplement packaging – shape people’s appraisal of the potential risks and benefits associated with consuming the product. It is predicted that the presence of a
function image on the dietary supplement packaging will increase the viewers’ perception of the product’s potential benefits relative to its risks. That is to say, if a person were to view a heart image on the packaging of a dietary supplement, they would infer the product’s function as relating to their heart and thus perceive a greater benefit in consuming the product for that particular health function. In the event that the data suggests a relationship between the presence of function images on product packaging and people’s judgements as to the product’s potential risks and benefits - further investigation will be undertaken into the possible causal mechanism underlying such a relationship. Specifically, it will investigate whether people’s belief as to the product’s function mediates the relationship between function image and perception of risk and/or benefit. Finally, this study aims to further our understanding of the decision-making process through the use of two self-report free response questions. These questions investigate what additional information participants wish to have appeared on the product packaging to assist with their decision-making, and participants’ self-reported decision-making process. This qualitative investigation will be restricted to UK participants only.
3.6 Participants

A total of 546 participants were recruited using a UK-based online panel and survey provider, and completed this online study in full. Initial data screening identified 52 participants to be screened from the sample - for various reasons that are described below - and so the final sample comprised 494 participants (237 females and 257 males, mean age = 40.70, $SD = 18.36$, range = 18-74). All the participants were permanent residents of Italy ($N = 145$), Romania ($N = 186$) or the UK ($N = 163$), and were members of established online panels in their country of residence. All participants received remuneration for their participation directly from the panel provider – this was in the form of points that could be converted to either cash or vouchers. Within each nationality a stratified sample of males and females across a breadth of age groups was obtained. To this end, all participants undertook a pre-screening questionnaire so as to ensure the criteria for the stratified sample were met. Individuals working professionally in the ‘Nutrition/Dietetics’ or ‘Food drink retail/manufacturing’ industries were excluded from participating, as were those with a comprehensive understanding of either the Dutch or German languages. These screens were deemed necessary due to the choice of stimulus materials. In addition, those intending to undertake the study on a tablet, mobile phone or other similar devise were also screened-out as a precautionary measure to ensure that the stimulus material could be viewed clearly. Participants completed the study in their own language. Demographic data, including terminal education level, current employment status and occupation, was collected from participants (see Table 1).

3.7 Design

This study took the form of an online experiment created using the survey software, Qualtrics™. The study was of a within-subjects design. The independent variable was the presence vs. absence of a function image on the fictional dietary supplement packaging. The dependent variables were participants’ mean belief ratings for, [1] critical health claims – that is, those written health claims that were congruent to the health function depicted by the function image, and non-critical
health claims – those that were incongruent with the product’s function as depicted by the function image, [2] the degree to which participants believed that a person would benefit from consuming the product, [3] the degree to which they believed that a person would be at risk from consuming the product, and [4] participants’ perception of the relative risk to benefit ratio.

Table 1. Demographic characteristics by country of residence.

<table>
<thead>
<tr>
<th></th>
<th>Italy (N = 145)</th>
<th>Romania (N = 186)</th>
<th>UK (N = 163)</th>
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<tr>
<td><strong>Gender</strong></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Males</td>
<td>74 (51.03%)</td>
<td>113 (60.75%)</td>
<td>70 (42.94%)</td>
</tr>
<tr>
<td>Females</td>
<td>71 (48.97%)</td>
<td>73 (39.25%)</td>
<td>93 (57.06%)</td>
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<tr>
<td><strong>Education</strong></td>
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</tr>
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<td>Primary School</td>
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<td>1 (0.54%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Secondary School (15/16yrs)</td>
<td>17 (11.72%)</td>
<td>3 (1.61%)</td>
<td>30 (18.40%)</td>
</tr>
<tr>
<td>Secondary school (17/18yrs)</td>
<td>39 (26.90%)</td>
<td>43 (23.12%)</td>
<td>16 (9.82%)</td>
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<tr>
<td>College or vocational qualification</td>
<td>31 (21.38%)</td>
<td>24 (12.90%)</td>
<td>58 (35.58%)</td>
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<tr>
<td>University (undergraduate)</td>
<td>40 (27.59%)</td>
<td>77 (41.40%)</td>
<td>47 (28.83%)</td>
</tr>
<tr>
<td>University (Postgraduate)</td>
<td>16 (11.03%)</td>
<td>38 (20.43%)</td>
<td>12 (7.37%)</td>
</tr>
<tr>
<td><strong>Employment Status</strong></td>
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<td></td>
</tr>
<tr>
<td>Unemployed</td>
<td>19 (13.10%)</td>
<td>4 (2.15%)</td>
<td>6 (3.68%)</td>
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<tr>
<td>Employed</td>
<td>54 (37.24%)</td>
<td>112 (60.22%)</td>
<td>74 (45.40%)</td>
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<td>Self-employed/freelance</td>
<td>24 (16.55%)</td>
<td>19 (10.22%)</td>
<td>14 (8.59%)</td>
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<tr>
<td>Homemaker</td>
<td>14 (9.66%)</td>
<td>8 (4.30%)</td>
<td>9 (5.52%)</td>
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<tr>
<td>Student</td>
<td>10 (9.66%)</td>
<td>18 (9.68%)</td>
<td>14 (8.59%)</td>
</tr>
<tr>
<td>Retired</td>
<td>24 (16.55%)</td>
<td>20 (10.75%)</td>
<td>40 (24.54%)</td>
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<tr>
<td>Unable to work</td>
<td>0 (0%)</td>
<td>5 (2.68%)</td>
<td>6 (3.68%)</td>
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<tr>
<td><strong>Occupation</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Higher managerial, administrative &amp; professional</td>
<td>11 (7.59%)</td>
<td>30 (16.13%)</td>
<td>8 (4.90%)</td>
</tr>
<tr>
<td>Intermediate managerial, administrative &amp; professional</td>
<td>28 (19.31%)</td>
<td>64 (34.41%)</td>
<td>38 (23.31%)</td>
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<tr>
<td>Supervisory, clerical &amp; junior managerial, administrative &amp; professional</td>
<td>58 (40.00%)</td>
<td>33 (17.74%)</td>
<td>59 (36.21%)</td>
</tr>
<tr>
<td>Skilled manual worker</td>
<td>19 (13.10%)</td>
<td>36 (19.35%)</td>
<td>19 (11.66%)</td>
</tr>
<tr>
<td>Semi-skilled manual worker</td>
<td>6 (4.14%)</td>
<td>8 (4.30%)</td>
<td>18 (11.04%)</td>
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<tr>
<td>Unskilled manual worker</td>
<td>23 (15.86%)</td>
<td>15 (8.07%)</td>
<td>21 (12.8%)</td>
</tr>
</tbody>
</table>

3.8 Materials

3.8.1 Supplement packaging. To begin, digital images were obtained of genuine dietary supplement packaging representing six health categories (weight management, cold and flu, memory, joints and muscles, bowel function, heart health). So as to be unfamiliar to participants, these genuine dietary supplements were not available for sale in any of the three sample countries (i.e., Italy, Romania,
UK), rather they were obtained from a neutral market – the Netherlands. Adobe Photoshop™ was used to isolate various elements of the packaging design - including any function images that were present – and to create a fictional product package. For each of the six health categories a fictional ‘front-of-pack’ dietary supplement packaging design was created. Each fictional package comprised a visually appealing design, with a fictional product name, a written health claim, the name of the active plant ingredients (e.g., Camellia Sinensis), the quantity of the plant in the supplement (e.g., 300mg), and some other peripheral text (e.g., the number of capsules inside the packet). Any text on the package appeared in the Dutch language, and so the final fictional product design simulated a dietary supplement available for sale on the Dutch market. This allowed the same stimuli to be used in each of the three target countries, and avoided the need to translate the packaging into the local language. In addition, for each stimulus package, a secondary version was created onto which a function image was added. That is to say, for each package a function image – one that represents the intended function of the product – was identified on a genuine dietary supplement intended for the treatment of that condition, and placed on the fictional design using Photoshop™. For example, to represent the health category ‘weight management’ a silhouette of a female torso with a tape measure wrapped around it was identified on a genuine product for weight management and placed on the fictional product representing the category of weight management. In short, two versions of each package was created, one with the function image present - hereafter, the image-present packages – these can be viewed in Figure 7, and one without the function image - the image-absent packages – that can be seen in Figure 8.

3.8.2 Written health claims. A set of eight written health claims relating to product function was created for use in this study. Six of these claims related to the health categories of weight management, cold and flu, memory, joints and muscles, bowel function and heart function. These functions thus reflected those depicted by the function images selected for use in this study. The remaining two written health claims were filler statements. That is, they did not directly relate to a product function as depicted by the function images. These claims represented the health categories of sleep and low mood. As with Study 1, these written health claims were all based on those found on the packaging of genuine dietary supplements, but
Figure 7. Product packages from the image-present condition. Image (a) represents the health category of ‘cold and flu’; (b) bowel function; (c) heart function; (d) bones and joints; (e) memory and cognition; and (f) weight management.

Figure 8. Product packages from the image-absent condition. Image (a) represents the health category of ‘cold and flu’; (b) bowel function; (c) heart function; (d) bones and joints; (e) memory and cognition; and (f) weight management.
adapted to ensure approximate consistency in terms of the number of words per claim. A full list of the written health claims used in this study can be found in Appendix E.

3.8.3 Risk/benefit claims. Scientific literature relating to the potential risk and benefit to health of consuming the active plant ingredient in each of the dietary supplements was reviewed, and from this, a set of four claims – two risk claims and two benefit claims - were selected to accompany each of the six fictional products. For example, for the plant ingredient *Camellia Sinensis* (Green Tea), representing the health category of weight management, the benefit claims ‘Contribute to fat oxidation’ and ‘Helps to reduce the appetite’ (EFSA, 2010), and the risk claims ‘Cases of liver damage have been reported’ and ‘May cause sleep disturbances’ were selected (EFSA, 2010, EMA, 2013). A full list of risk and benefit claims can be found in Appendix F.

3.9 Procedure

Participants meeting the inclusion criteria for participation in this study received an email, from the UK-based online panel and survey provider, containing a secure web address directing them to the online study. After consenting, participants received additional written instructions on the screen. To begin, a random exemplar of the dietary supplement product packages appeared on the screen accompanied by the question “based on the packaging shown above, what do you think this product might be used for?” Participants were instructed to rate, on eight individual 8-point Likert scales, the degree to which they believed each of the written health claims to be true in relation to the shown product. The order of the written health claims was assigned at random and varied between the six trials (An example of this section of the survey is shown in Figure 9a). On completing all eight ratings, the participants were explicitly told the intended function of the product. The product’s function appeared clearly on the screen together with two written risk statements and two written benefits statements, relating to the consumption of the shown dietary supplement. Participants were instructed to read this information before indicating on three further Likert scales the degree to which they, [1] believed that somebody intending to take the product for the named health function might benefit from it –
The packaging below is for a fictional health supplement. Please look carefully at the packaging, and then answer the following questions.

Based on the packaging shown above, what do you think this product might be used for?

This product aids in the maintenance of a healthy heart.

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This product supports weight loss.

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This product helps improve memory.

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This product aids in the maintenance of healthy joints and muscles.

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This product improves bowel function.

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This product aids sleep and promotes restfulness.

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This product relieves the symptoms associated with colds and flu.

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This product relieves the symptoms of low mood and mild anxiety.

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*Figure 9a.* Screenshot of the belief rating scales in the online survey used in Study 2. This example is from the image-present condition for the health category heart-function.
Here is some more information about the product you just saw.

This product aids in the maintenance of a healthy heart.

On the scale below, rate the degree to which you believe that somebody with this particular health complaint might benefit from taking this product.

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<td>Definitely will not benefit</td>
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<td>Definitely will benefit</td>
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On the scale below, rate the degree to which you believe that somebody with this particular health complaint might be at risk from taking this product.

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<tr>
<td>Definitely at risk</td>
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<td></td>
<td></td>
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<td>Definitely not at risk</td>
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On the scale below, rate the degree to which you think the benefits of taking this product might outweigh the risks.

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<tr>
<td>The risks outweigh the benefits</td>
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<td>The benefits outweigh the risks</td>
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Figure 9b. Screenshot of the online survey used in Study 2: Risk-Benefit ratings. This example is from the image-present condition for the health category heart-function.

with a rating of 1 being “definitely will not benefit” and 10 being “definitely will benefit”, [2] believed that somebody intending to take the product for the named health function might be at risk from it – with a rating of 1 being “definitely at risk” and 10 being “definitely not at risk”, and [3] believed that the benefits of taking this product outweighed the risks – with a rating of 1 being “the risks outweigh the benefits” and a rating of 10 being “the benefits outweigh the risks” (An example of this section of the survey can be seen in Figure 9b). At this point a
new dietary supplement package appeared, and the above procedure was repeated for the remaining five packages. Each participant saw three image-present packages and three image-absent packages; the assignment of packages to image condition was counterbalanced across participants. After the participants had viewed and rated all six dietary supplement packages, they were required to answer two free response questions about the products they had seen previously. Firstly, participants were instructed to think about the products they had viewed, before listing any additional information they would have liked to see on the product packaging, and that would have helped them arrive at their decisions in the previous tasks. In addition, they were asked to describe how they arrived at their ratings for the products. Finally, participants recorded their age, gender, employment status and occupation before being thanked and debriefed. A printed version of this online study can be seen in Appendix H.

3.10 Ethics

This study received a favourable opinion from the University of Surrey Ethics committee, a copy of which can be found in Appendix G.

3.11 Initial Data Screening

Data from 546 responding participants were screened for inclusion in the final analysis. Specifically, participants’ responses on the three Likert-scale questions relating to the potential benefits, risks and risk:benefit trade-off of consuming each product, were considered. For each of the six products viewed, participants had been required to rate their responses to these questions on a 10-point Likert scale. Each participant therefore made a total of eighteen responses during the course of the study. These responses were screened to identify participants who had entered the same rating score fifteen or more times. To this end, 52 participants (Italy \( N = 8 \); Romania \( N = 25 \); UK \( N = 19 \)) were removed from the final data set. The screened sample for final data analysis therefore comprised 494 participants.
RESULTS

3.12 Data Analysis

Participants’ responses were collected using the online survey software, Qualtrics™. These responses were initially exported to MS Excel and then to SPSS version 20 (IBM Corp., 2011) for analysis.

Data were analysed in the following ways.

(i) Differences in participants’ mean belief ratings for critical written health claims were assessed using a 2(Function Image) x 3(Country) mixed-measures analysis of variance (ANOVA).

(ii) Differences in participants’ mean belief ratings for non-critical written health claims were also assessed using a 2(Function Image) x 3(Country) mixed-measures ANOVA.

(iii) Differences in participants’ mean belief ratings for critical and non-critical written health claims were assessed using a two-way (Health Claim Type vs. Function Image) within-subject ANOVA.

(iv) Differences in participants’ belief ratings for critical and non-critical written health claims by health category were assessed using a repeated-measures ANOVA.

(v) Differences in participants’ perception as to the potential risk and benefit of consuming the product for its intended purpose were assessed using a two-way repeated-measures ANOVA.

(vi) The relationship between function image and participants’ risk and benefit judgements was investigated using a series of mediation analyses.

(vii) Participants’ judgements as to the ratio of potential risk to benefit gained through consuming the product was assessed through a paired sample t-test (total sample), and a mixed-measures ANOVA (by country).

(viii) A qualitative analysis of participants’ self-report of their decision-making processes was achieved by selecting key themes and phrases from participants’ responses.
3.13 Mean Belief Ratings for Health Claims

3.13.1 Critical health claims. One of the aims of this study was to test the replicability of the findings from Study 1. That is, this study sought to test whether the presence of function images on fictitious dietary supplement packaging would alter participants’ belief ratings for written health claims. The findings of Study 1 suggest that health claims will be rated as more believable when a function image is both present on the product’s packaging and congruent with the written health claim, compared to when the function image is absent from the product’s packaging or incongruent with the written health claim. For this analysis participants’ responses to the critical claims – those health claims that were congruent with the function of the product as depicted by the function image - were analysed separately from the remaining seven non-critical claims. To this end, a 2(Function Image: Present vs. Absent) x 3(Country: Italy vs. Romania vs. UK) mixed-measures analysis of variance (ANOVA) was performed on the data. The analysis of participants responses to critical claims replicated the findings from Study 1, in so much as they revealed a significant main effect of function image, \((F[1,491] = 793.14, p < .01, \eta_p^2 = .62)\). In sum, the results of this analysis confirm that participants are indeed drawing inferences from the function images displayed on the product packaging. Thus these images are acting as health claims; in so much as they are influencing participants’ expectations as to the product’s function. In addition, the analysis revealed a significant interaction effect between function image and country, \((F[2,491] = 3.33, p = .04, \eta_p^2 = .01)\). A post-hoc Bonferroni comparison of country suggests a significant difference between the mean belief ratings from UK and Italian participants, \((p = .002)\). However, no such difference was observed between ratings from either UK and Romanian \((p = .079)\), or the Romanian and Italian participants, \((p = .460)\). Figure 10 indicates that, when compared with the Italian and Romanian responses, UK participants were more conservative with their belief ratings when the function image was present on the dietary supplement packaging.
Figure 10. Mean belief ratings for critical claims by participants’ country of residence. Error bars represent standard errors.

Figure 11. Mean belief ratings for non-critical claims by participants’ country of residence. Error bars represent standard errors.
3.13.2 Non-critical health claims. A further 2(Function Image: Present vs. Absent) x 3(Country: Italy vs. Romania vs. UK) mixed-factor ANOVA was performed on participants’ ratings of the non-critical health claims – those claims that did not relate to the given function of the product. The analysis revealed a significant main effect of function image, \((F[1,491] = 378.01, p < .001, \eta^2_p = .44)\). That is to say, participants’ belief ratings for non-critical health claims were significantly reduced when a function image was present on the product’s packaging; this can be seen in Figure 11. A significant interaction effect of function image and country was also found, \((F[2,491] = 3.70, p = .025, \eta^2_p = .02)\). However, a post-hoc Bonferroni pairwise comparison of country suggests that there was no significant variation in participants’ ratings by country (UK vs. Romania \(p = .352\), UK vs. Italy \(p = 1.00\), Romania vs. Italy \(p = 1.00\)). Figure 11 further indicates that whereas participants were more conservative in their belief ratings for the non-critical claims in comparison to their belief ratings for the critical claims, there was no apparent variation between the countries.

3.13.3 Comparison of mean belief ratings for critical and non-critical health claims. This study hypothesised that in the presence of a function image participants would rate health claims congruent to the products’ purported function (critical claims) as more believable than incongruent claims (non-critical claims). To this end, a 2(Health Claim Type: Critical vs. Non-Critical) x 2(Function Image: Present vs. Absent) within-subjects ANOVA was performed. As hypothesised, the results of this analysis reveal a significant difference between participants’ belief ratings for critical and non-critical health claims, \((F[1,493] = 1180.87, p < .001, \eta^2_p = .71)\). A significant main effect of function image was also found, \((F[1,493] = 295.51, p < .001, \eta^2_p = .38)\) suggesting that the participants did indeed use the function image on the product packaging to make inferences as to the product’s health function, and to assist them with their belief judgements. A significant interaction effect of function image and health claim type was likewise found, \((F[1,493] = 1097.68, p < .001, \eta^2_p = .69)\). Post-hoc paired sample \(t\)-tests confirm these findings suggesting that, as predicted, participants rated critical claims as more believable in the presence of a congruent function image, \((M_{\text{present}} = 6.79, SD = 1.27, M_{\text{absent}} = 4.18, SD = 1.68, t[493] = -28.24, p < .001, d = -1.28)\). However, as can be seen in Figure 12, the reverse was found for non-critical claims with belief ratings
significantly decreasing when the function image was present, \( M_{\text{present}} = 2.32, SD = 1.42; M_{\text{absent}} = 3.20, SD = 1.37, t[493] = 19.38, p < .001, d = 0.87 \). This finding replicates exactly that of Study 1.

![Figure 12. A comparison of mean belief ratings for critical and non-critical health claims.](image)

### 3.13.4 Comparison of mean belief ratings by health category. The data were further analysed to compare participants’ belief ratings for critical and non-critical claims across the six health categories. To this end, a 2(Health Claim Type: Critical vs. Non-Critical) x 2(Function Image: Present vs. Absent) x 6(Health Category: weightloss vs. memory vs. joints & muscles vs. bowel function vs. heart function vs. cold & flu) repeated-measures ANOVA was conducted. The results of the ANOVA suggest a marginally significant main effect of health category on participants’ belief ratings, \( F[1.26, 621.89] = 3.01, p = .07, \eta^2_p = .01 \). That is, this trend suggests that the participants’ overall belief in the claims may be dependent upon which product they saw. The analysis further revealed, no significant interaction effect between function image and health category, \( F[1.57, 776.41] = 0.56, p = .53, \eta^2_p = .00 \) suggesting that the effect of function image on overall beliefs was approximately equal across the health categories. The analysis did however reveal a significant three-way interaction between function image, health claim type
and health category, \((F[65.22, 12.28] = 5.31, p = .009, \eta^2_p = .01)\). To explore this three-way interaction further, a series of two-way ANOVAs were conducted, one for each of the six health categories. As predicted, these tests revealed a significant two-way interaction between function image and claim type for all of the six health categories, Weightloss \((F[1,494] = 69.20, p < .001, \eta^2_p = .12)\), Memory \((F[1,494] = 59.00, p < .001, \eta^2_p = .107)\), Joints \((F[1,494] = 70.21, p < .001, \eta^2_p = 124)\), Bowel function, \((F[1,494] = 75.54, p < .001, \eta^2_p = .133)\), Heart function \((F[1,494] = 311.94, p < .001, \eta^2_p = .074)\), and Cold & Flu, \((F[1,494] = 58.34, p < .001, \eta^2_p = .106)\). This finding mirrors that of Study 1, and simply shows that the size of the effect of function images on critical vs. non-critical health claims differed across the health categories. Post-hoc paired \(t\)-tests for each of the six health categories suggest the same significant trend. That is, when a function image is present on the products’ packaging, participants’ belief ratings for critical claims increases and their ratings for non-critical claims decreases, relative to their ratings for those same health claims when the function image is absent from the packaging.

### 3.13 Perception of the Potential Risks and Benefits of Consuming Products.

This study also aimed to investigate how the presence of a function image on a product’s packaging affected consumers’ perception of the potential risks and benefits of consuming the product for a particular health condition. It was predicted that the presence of the function image on the product’s packaging would act to increase participants’ perception of the potential benefits of consuming the product, relative to their ratings when the function image was absent. Participants were asked to rate the degree to which they believed that somebody with this particular health complaint might benefit/ be at risk from taking this product on a 10-point Likert scale. To this end, a 2(Perception: Benefit vs. Risk) x 2(Function Image: Present vs. Absent) repeated-measures ANOVA was conducted. The analysis revealed a significant main effect of perception, \((F[1,493] = 323.45, p < .01, \eta^2_p = .396)\). That is to say, participants’ ratings of the potential risks and benefits of taking the products differed significantly. A significant main effect of function image was also found, \((F[1,493] = 21.55, p < .01, \eta^2_p = .042)\). The interaction effect between perception and function image was also significant, \((F[1,493] = 12.82, p < .01, \eta^2_p = .025)\). Post-
hoc paired sample t-tests suggest that participants had a greater overall belief in the benefits of consuming the product versus the risks. That is, participants consistently rated their belief in the benefits of taking this product more highly, compared with their ratings of the risks, regardless of whether the function image was present ($M_{\text{present}} = 6.67, SD = 1.94; t[493] = 17.19, p < .01, d = 0.77$), or absent ($M_{\text{absent}} = 6.28, SD = 1.98; t[495] = 15.09, p < .01, d = 0.68$), on the product packaging. Furthermore, the presence of a function image was found to significant increase participants’ belief ratings for the perceived benefit of taking the product, ($t[493] = 6.05, p < .001, d = 0.27$). However, the presence of the function image only marginally influenced participants’ ratings for the perceived risks of consuming the product, ($M_{\text{present}} = 5.19, SD = 1.97; M_{\text{absent}} = 5.06, SD = 1.92, t[493] = 1.86, p = .06, d = 0.08$).

![Figure 13. Perception of the potential risks and benefits of consuming products. Mean risk/benefit ratings in response to (i) perception of benefit question and (ii) perception of risk question.](image)
3.14 Relationship Between Function Image and Risk and Benefit Judgments.

A series of mediation analyses were performed to further investigate the mechanism underlying the relationship between the variable function image and the outcome variables that are participants’ risk and benefit judgements. Of particular interest, in terms of the hypotheses for this study, is whether participants’ initial belief ratings for critical and non-critical health claims mediated this relationship. The mediation analyses were performed using Hayes’ (2013) PROCESS procedure, using 1,000 bootstrap resample on participants’ responses to a single product. That is to say, only participants’ responses to the first fictional dietary supplement product they viewed were included in this analysis.

The results of the analyses indicate that the indirect effect of function image on risk judgements, through belief ratings, was significant, \(B = .39, SE = .13, p < .001, 95\% CI = .14/1.64\). The remaining direct effect of function image was not significant, \(B = -.38, SE = .24, t = -1.58, p = .11\). Similarly, the indirect effect of function image on benefit judgement, through belief ratings, was also significant, \(B = .78, SE = .13, p < .001, 95\% CI = .55/1.05\). The remaining direct effect of function image was not significant, \(B = .35, SE = .22, t = -1.62, p = .11\). The findings from these analyses appear to suggest that function image may influence people’s perception of the product’s benefit – and maybe risk – as a result of priming their expectation as to the product’s health function. In short, if a person views a product carrying an image of a heart, their expectation is that the product is beneficial to their heart. Thus when their expectation as to the product’s function is confirmed as correct, they might experience feelings of positive affect towards the product, and so believe that the stated benefits are more likely to occur.

3.15 Perception of the Ratio of Risk to Benefit

It was predicted that an inverse relationship exists between participant’s perception of the risk and benefits of taking the dietary supplement for the stated health function. That is to say, if the benefits of taking the product were judged to be high then the perceived risks would be judged to be low. Furthermore, it was predicted that the relative risk to benefit trade-off would be judged to be greater in favour of benefit if a function image was present on the dietary supplement packaging. A paired sample t-test was conducted to test this prediction, \(M_{\text{present}} = \)
5.88, $SD = 2.06; M_{\text{absent}} = 5.65$, $SD = 2.02$, $t[493] = 3.27$, $p = .001$, $d = .11$). These results support the hypothesis by suggesting a significant difference between participants’ judgement of the ratio of risk to benefit when a function image was present on the product’s packaging, and also that participants’ reported a greater ratio of perceived benefit to risk when the image was present on the product’s packaging. In addition, a 2(Function Image: Present vs. Absent) x 3(Country: Italy vs. Romania vs. UK) mixed-measures ANOVA was performed and suggests that this findings was consistent across the three sampled countries. That is to say, no significant interaction was found between function image and country, ($F[2,491] = 2.27$, $p = .105$, $\eta^2_p = .01$).

3.16 Qualitative Analysis of the Decision-Making Process

Participants were asked to self-report aspects of their decision-making process in two free response questions. For the purposes of this analysis, only responses from UK participants were examined. On completing their ratings for the products, participants were asked to list any additional information they would have liked to have seen on the products’ packaging that would have assisted them in making their decisions in the previous rating tasks. Of the 161 UK participants who completed this study, seventeen were removed from the analysis as they either failed to adequately understand the requirements of the task or chose not to leave a response to this question. Twenty-seven participants indicated that the information presented on the product packaging was adequate and that they required no additional information to assist with their decision-making. Of the 117 participants who listed additional information, forty-two requested that the text on the product packaging appear in English. This request was as expected given the nature of the stimulus material. A further thirty-five participants requested additional text based information, such as risk/benefit information or scientific research, be displayed on the products’ packaging.

“risk/benefit should be on the packaging”
“Risks and benefits actually on the front of the product packaging”
“Some statistical evidence of risk/benefits”
Of most relevance to the present focus, forty participants wrote that additional pictures, symbols and/or other graphics on the front-of-product packaging would have assisted them in their decision-making. This included specific requests for images referencing the part(s) of the body to be ‘treated’ by the dietary supplement.

“I would prefer to see more information portrayed in the picture form.”
“A picture of the area of the body involved in the particular ailment”
“I think that more obvious illustration (like the one for the bowel supplement) would be a great help for everyone.”

A second question asked participants to describe as best they could how they arrived at the ratings they had made in the previous tasks. Of the 161 participants completing this study, twenty-seven were either removed from the analysis as they failed to adequately understand the question or chose not to respond. Sixteen participants self-reported guessing at their ratings. However, sixty-two participants reported that, where possible, they had made use of the function images present on the product’s packaging to assist them with their ratings of the products.

“The packages with images on gave me a better impression of the product.”
“Based my decision on the picture on the packaging”
“Pictures or parts of the body highlighted”

Five participants reported that they made reference to some aspect of the product’s packaging, such as its name or active ingredients, to assist them in their decision-making. Seven participants reported that they used their prior knowledge of similar products rather than any information presented in the study. Finally, forty-four participants reported that they referred to the risk and benefit statements presented with each product during their decision-making.

“The benefit/risks provided me with enough information to make a judgement.”
“Just considered the benefits and side effects given and made a judgement decision.”

Taken together these participant self-reports lend further weight to the notion that people use images on product packaging to draw inferences as to the product’s function. It further suggests that in some instances people are actively making use of the function images present on the packaging as part of a conscious decision-making process. However, it should be cautioned that these responses do not provide a comprehensive picture of the participants’ decision-making process, rather they provide an overview and thus may exclude any unconscious – or spontaneous – decision-making that may have occurred alongside these more conscious decisions.
DISCUSSION

This study aimed to test the robustness of the findings from Study 1; that is, images can act as health claims, insofar as they can lead people to infer a product’s health function. The data from this current study do indeed confirm this finding by suggesting that participants’ judge written health claims to be more believable when a function image was both present on the product packaging, and congruent to the written health claim. Again, these findings are in line with previous research that suggests that images can act as health claims (e.g., Carrillo et al., 2014, Saba et al., 2010), and also current EC legislation on the use of nutrition and health claims made on foods (EC, 2006). In addition, they concur with research suggesting that congruence between elements on a product’s packaging leads to a more favourable overall perception of the product by the consumer (e.g., Van Rompay et al., 2009, Van Rompay & Pruyn, 2008).

This study further aimed to investigate the role of packaging imagery on people’s appraisal of the potential risks and benefits of consuming products. The data indicate that the presence of a function image on the product packaging significantly increased participants’ perception of the benefits of consuming the product relative to the risks. However, no such significant effect was found for participants’ perception of the potential risks. The results of the mediation analysis may go some way towards providing an explanation for these findings, by suggesting that the relationship between function image and participants’ perception of the product’s benefit was mediated by their belief in the product’s function. However, belief was not found to mediate the relationship between function image and participant perception of risk. An explanation as to why products were perceived as having greater potential health benefits when a function image was present, may, in part, be due to a familiarity effect arising from processing fluency. Previous research has suggested that easily processed – or fluent – stimuli are often equated with familiarity (Bornstein & D’Agostino, 1992, 1994, Reber et al., 1998). That is, people often infer familiarity when a stimulus feels easy to process and it is this sense of familiarity that induces feelings of positivity towards it. So in terms of the study, function image are priming people’s expectations as to the products’ function. Therefore, if a person were to see a product displaying an image of a heart on it’s
packaging, they may infer that the product’s function was to improve heart health. Thus subsequent confirmation of these expectations would lead to increased feelings of positivity towards the product, and consequently when the person was asked to rate the product; they rated it as more beneficial in comparison to products that didn’t display a function image. The presence of the function image therefore reduced the cognitive effort required for a judgement as to the potential risks and benefits and so allowed the person to use a more heuristic decision-making process. This finding also provides insight into the relationship between risk and benefit judgements, suggesting that they may indeed be distinct and different concepts in people’s minds (e.g., Berry, 2004), rather than existing on a continuum. That is to say, the feelings of positivity resulting from the increased fluency provided by the function image, significantly increased people’s perception of benefit, but did not significantly influence people’s perception of risk. In sum, these findings offer support for the notion that packaging imagery can lead people to infer health properties for products, and that these inferences can influence people’s perceptions as to the benefits of consuming these products.

The present study aimed not only to replicate the findings of the previous study, but to do so with a more diverse and representative sample. Thus the sample used in this study was recruited from three European Community Member States, and was representative of a range of ages, genders, occupations and educational backgrounds. A finding of particular note is therefore that no significant main effect of country - either in terms of participants’ belief ratings for critical and non-critical written health claims, or for their judgements as to the potential risks and benefits of consuming the products – was found. This is an important finding given that any differences between countries would have presented a challenge for legislators who currently regulate the use of health claims at Community, rather than Country level.

3.17 Methodological Limitations

These findings do however raise questions as to the nature and origin of these inferences. The current findings would seem to suggest that these inferences arise as a result of System 1, or heuristic, processing. However, the methodology used in this study – a direct questioning method - may result in the elicitation of inferences that would not be made unprompted, and might fail to capture inferences made implicitly
and without conscious awareness. Therefore, further research is needed to investigate the nature of these inferences. To this end, these limitations are addressed in Studies 4, 5, 6 and 7, through the use of a novel indirect memory-based measure.

Further methodological limitations of this study may relate to the choice of stimulus materials, both in terms of the product packaging used, and the selection of risk and benefit statements. Furthermore, the use of ratings scales as a measure may also be considered limiting.

The fictitious dietary supplement packages were created to represent a neutral market – the Netherlands. Thus any text present on the packaging was in the Dutch language. Understandably when the participants were asked what other packaging information would have helped them to reach their judgements, many of them requested the packaging in English. Having the text in Dutch allowed for the control of the variable function image, however it would undoubtedly be useful to know what other information the participants might have attended to and how text-based information might have interacted with the function images. Thus Study 6 explores the relationship between text-based information and function image on product packaging. Although the fictitious products allowed for a high level of control and reduced the possibility of bias arising from previous experience, it meant the study was lacking in ecological validity. It would, for instance, be useful to see if the effect of packaging imagery were still present when the product was a familiar one. Also, although current EC legislation covers the use of health claims on foods, beverage and dietary supplements, people’s perceptions as to the potential health functions of dietary supplements undoubtedly differ from their perceptions as to the potential health benefits of food and beverage products. In short, a person’s motivation for purchase – and thus their underlying decision-making process – may vary between dietary supplements and foodstuff. It is therefore important to investigate the effects of packaging imagery on all types of product covered by the current legislation. The following study – Study 3 – will therefore examine the effect of health imagery on people’s perception of the healthiness of well-known branded products.

Furthermore, the risk and benefit statements used in this study may also be considered as a limitation. The decision was made to use actual risk and benefit
statements; that is statements currently in use on dietary supplement packaging. Risk/Benefit statements were selected from the scientific literature produced by the European Food Standards Agency (EFSA) and the European Medicines Agency (EMA) that related to the potential risks and benefits of consuming the active plant ingredients in each of the six dietary supplements to be tested in this study. However, although the decision to use actual risk and benefit statements acted to improve the ecological validity of this study, these statements were not necessarily matched in terms of their salience. That is to say, these statements were not matched for characteristics such as length, use of scientific terminology or familiarity to the consumer. For example, the benefit statement for the dietary supplement Cassia angustifolia – which represents the health category of bowel function – reads “Improves bowel function”, whereas the associated risk statement reads “electrolyte disturbances.” Statements, such as this, assume that the consumer has the necessary knowledge to understand the role of electrolytes and why their disturbance may present a risk. In addition, these statements also vary both in terms of the immediacy of risk and benefit, as well as the potential strength of the effect. For example, the risk of “headaches and dizziness” associated with consuming the dietary supplement Ginkgo Biloba may be considered as relatively immediate, yet mild when compared with the longer-term, but potentially more serious risk “Possibility of a carcinogenic risk of long-term use” associated with consuming the dietary supplement Cassia angustifolia. Such disparities between the salience of statements may be all the more relevant given that data from this study suggest that consumers’ perception as to the potential risks and benefits of consuming these products are likely the result of familiarity derived from ease-of-processing, and thus the potential effect associated with the wording of risk and benefit statements warrants further investigation.

A final methodological limitation of this study relates to the direction of the ratings scales for the risk and benefit questions. For the question ‘rate the degree to which you believe that somebody with this particular health complaint might benefit from taking this product.’ – the scale ran from 1 ‘definitely will not benefit’ to 10 ‘definitely will benefit’. Whereas for the risk version of the question the scale was inverted, that is, 1 became ‘definitely at risk’ and 10 became ‘definitely not at risk’. This inversion was initially chosen so as to keep risk ratings for both scales at the bottom end – that is, a rating of 1 would represent the greatest risk on both scales,
with a rating of 10 representing the greatest benefit on both scales. It is therefore possible that this inversion may have resulted in confusion amongst the participants, and thus may go some way towards explaining the minimal effect of risk.

3.18 Conclusion

The data from this study have confirmed the findings from Study 1, insofar as they suggest that images can act as health claims. In this instance, the imagery present on the product’s packaging primed consumers’ expectations as to the product’s health function and, when this expectation was later confirmed, feelings of positive affect resulted. Thus the presence of the function images consistently lead participants to rate these products as more beneficial to health. However, this study is not without its limitations and further research is needed into the nature of inferences. The following study expands on the current one with the use of genuine food and beverage packaging, as well as the type of packaging imagery used – in this case, general health imagery in the form of logos for the London 2012 Olympic Games.
CHAPTER FOUR

STUDY 3: The Effects of Olympic Branding on People’s Beliefs as to the ‘Healthiness’ of Sponsored Food and Drink Products.

4.1 Chapter Overview

The research presented in the previous two chapters indicates that people do indeed use packaging imagery to draw inferences as to the product’s health function. Study 2 furthered these findings by suggesting that images on a product’s packaging could influence people’s beliefs as to the relative benefits associated with consuming the product. The previous studies were however limited insofar as they used fictitious dietary supplement products as stimuli, and investigated the relationship between function images and people’s understanding of written health claims. The present study will investigate the effect of packaging imagery in the absence of any written claims, and thus should go some way towards furthering our understanding of images as health claims in their own right. Furthermore, this study will investigate how the addition of packaging imagery to known branded products influences their perception as to the healthfulness of those products. The London 2012 Olympic Games therefore afforded a unique opportunity to study the effects of packaging imagery on people’s perception of health.

4.2 Introduction

In the period leading up to the London 2012 Olympic Games concerns were raised over the London Organising Committee of the Olympic Games’ (LOCOG) choice of official food and drink sponsors (e.g., Blitz, 2012, Clark, 2012, Smithers, 2012). LOCOG selected McDonalds, Coca-Cola and Cadburys as the exclusive provider of Olympic branded food and drink products. As Official World Partners of the Olympic Movement, McDonalds and Coca-Cola were permitted to display either the official ‘Olympic Rings Logo’ or the ‘London 2012 Logo’ on their products’ packaging. Cadbury, as an ‘Official Supporter’ of the Games, was permitted to display the ‘London 2012 Logo’ on their products’ packaging (London 2012, 2009). However, critics suggested that by choosing these companies as sponsors, LOCOG had facilitated the marketing of junk food to children by providing these companies
with an unrivalled platform on which to promote their brands and products, and to reaper the benefits of associations with athleticism and sporting success (Clark & Brownell, 2012). Other critics of LOCOG’s choice of official sponsors included Dr Tony Jewel, Chief Medical Officer for Wales, and Cardiologist Dr Aseem Malhotra, both of whom suggested that the choice of sponsors for the event was at odds with the Olympic ideals of health, wellness and educating by good example (BBC News, 2012, International Olympic Committee, 2012, McWatt, 2012). However, companies are keen to be associated with the Olympic brand. The Olympic movement stands for excellence, fair play, friendship, acceptance, dedication, health and wellbeing. There is also a strong sense of authenticity derived from over a century of traditions associated with the Games. These ideals provide the kind of assertions that a sponsor wants to be associated with their brand (Davis, 2012, Farrand, Chappelet, & Seguin, 2012).

There is evidence to suggest that the concern over LOCOG’s choice of sponsors may be warranted. For example, children as young as 3 years old have been found to have an emerging knowledge of brands that are relevant to their lives (McAlister & Cornwell, 2010), and are unlikely to make food choices in the absence of an outside influence (Dalmeny, 2003). Food marketing and sponsorship therefore have an important influence on children’s food preferences, purchasing requests and consumption. Furthermore, children who are exposed to television advertisements for high-calorie foods are more likely to request high fat, energy dense snacks than healthy foods (Francis, Lee, & Birch, 2003). Similarly, Arredondo, Casteneda, Elder, Slymen, and Dozeer (2009) found that, on average, children recognised fast food logos at a much higher frequency than other food logos, with McDonald’s logo being recognised by 89% of children. Overweight children were also found to be more likely to recognise fast food logos than children of a normal weight. In another study, Robinson, Borzekowski, Matheson, and Kraemer (2007) found that preschoolers rated products packaged with a heavily marketed brand to be tastier than those same foods in plain packaging. The findings of these studies are concerning, particularly in the light of evidence suggesting that children’s knowledge of brands offering products high in sugar, salt and fat is a significant predictor of a child’s body mass index (BMI), even after controlling for that child’s age, gender and television viewing (Cornwell, McAlister, & Polmear-Swendris, 2014). Finally, although the
majority of research has centred on the influence of food marketing and branding on children’s food preferences and choices, there is also evidence to suggest that food marketing affects adult food consumption (Harris, Bargh, & Brownell, 2009).

One technique that has been frequently employed by marketers and advertisers is ‘evaluative conditioning’. This is a form of associative learning whereby an attitude object is paired repeatedly with an object which is either viewed positively or negatively, as a means of making the attitude object either more positive or negative (De Houwer, Thomas, & Baeyens, 2001). It is the hope of the sponsor that pairing their product with the positive attributes of the Olympic Games will cause consumers to view their product more positively. Such a relationship occurs as the positive characteristics associated with the sponsored object or event becomes intrinsically linked in memory with the sponsoring brand. In essence, the ‘brand identity’ of the Olympic Games is transferred to the sponsoring brand (Gwinner, 1997, Gwinner & Eaton, 1999). This process was experimentally tested by Gibson (2008) who reported that the evaluative conditioning created the conditions necessary for participants to predictably choose between the brands Coca-Cola and Pepsi depending on which had been paired with a positive meaning.

Generally speaking, research has indicated that the more congruent the relationship between the sponsor and the sponsored object/event is perceived to be by the consumer, the greater the positive outcome for the sponsor (Gwinner & Eaton, 1999). Consumers who perceive a greater degree of ‘fit’ between the sponsor and the sponsored object generally have a more positive response to the relationship, including a more positive attitude towards the event and greater brand recall and recognition (Roy & Cornwell, 2004, Olson & Thjømøe, 2011). It is therefore interesting to note that despite the obvious ‘misfit’ perceived by critics of LOCOGs choice of sponsors, the International Olympic Committee (IOC) refuses to enter into sponsorship agreements with companies, products and brands that are deemed not to be harmonious with its values (Kenyon & Palmer, 2008). Thus we must conclude that both LOCOG and the IOC consider the values and ideals of McDonalds, Cadbury and Coca-Cola to harmonise with their own.

Finally, although the Olympic logos are not in and of themselves ‘health logos’ in the same way as the more regulated Green keyhole symbol (Larsson et al., 1999); Healthy Choices Logo (Dotsch-Klerk & Jansen, 2008); or the smart choices
logo (Lupton et al., 2010), it is possible that the Olympic logos may serve many of the same functions as these ‘health logos’, due to their implicit or explicit association with the Games’ ideals of health, fitness and wellbeing.

4.3 Aims

This study aims to examine whether the Olympic Rings Logo and the London 2012 logo, hereafter referred to as Olympic branding, have the potential to act as a health claim due to their association with the health, fitness and wellbeing ideals of the Olympic movement, and thus act to alter people’s beliefs as to the perceived ‘healthiness’ of products displaying this branding. This was achieved through the use of an online survey in which participants viewed a product from one of the three Official sponsors, some of which displayed Olympic branding. Participants were asked to estimate the sugar, fat and calorie content of the product they viewed. These estimates were taken as a measure of belief as to the ‘healthiness’ of the product. It was predicted that, if the Olympic branding were to act as a health claim, participants would give lower – or ‘healthier’ - estimates of sugar, fat and calories for the products.
METHOD

4.4 Participants
Participants were invited to undertake the survey during the period from the 23rd July to the 12th August 2012; these dates covered the duration of the London 2012 Olympic Games and the 5 days immediately preceding it. During this time advertisements inviting people to participate were placed on several popular international social networking sites and Internet forums. A total of 390 people responded by participating in the survey; however 70 participants were immediately removed from the sample as their answers were incomplete and thus no useful information could be gained. The final sample numbered 279 participants of which 137 were male and 142 were female. The mean age of the sample was 41.7 years (SD = 16.0, Range: 14 – 79 years). Although the survey was advertised on social networking and Internet forum sites that had an international user base, the majority of participants indicated that they were permanent UK residents (97.8%). The participants were also asked to indicate their terminal level of education; 7.2% indicated that they held no formal qualifications; 12.9% held GCSE/ ‘O’ Level or equivalent qualifications; 34.0% ‘A’ level or equivalent vocational qualifications; 38.7% undergraduate degree; and 7.2% a post graduate degree.

4.5 Design and Materials
This study took the form of an online survey of approximately three minutes duration that could be completed by participants at a time of their own choosing. The survey was created using the survey software Sawtooth™ and hosted on the University of Surrey’s website. Participants were able to access the survey via a secure web address embedded in the invitation to participate.

The independent variable for this study was the presence or absence of Olympic branding on the packaging of food and beverages supplied by the three Official Olympic food sponsors - McDonalds, Cadbury and Coca-Cola. This variable was manipulated between-subjects. The dependent variable of this study was the participants’ estimates of the fat, sugar and calorie content of the products.
These estimates were taken as a measure of participants’ belief in the relative healthiness of the product.

4.5.1 Selecting product packaging. In order to keep the overall duration of the survey to a minimum and to ease the comparison of findings, it was decided that the three Official Sponsors should each have a single product to represent them. To this end, I obtained a selection of Olympic branded products available for sale from the three official sponsors for possible inclusion. Only products readily available for sale in the UK were considered. Each of the products was then evaluated for possible inclusion in the study. As the product was to be viewed as an image in an online survey, it was essential that both the Sponsor’s branding and the Olympic branding could be seen together in a single front-of-pack photograph of the product. Therefore the packaging of each product was evaluated for the position and clarity of the branding. Furthermore, to ensure that any effects found were the result of Olympic branding, products with multiple or unrelated logos and/or branding symbols’ were disregarded. Limited edition or specially redesigned Olympic themed packaging was not considered.

Photographs were taken of the three selected products, a McDonalds McChicken® Sandwich, a Cadbury Flake and a can of Coca-Cola. These photographs comprise the stimuli of the ‘Olympic branding present’ condition and can be viewed in the left-half of Figure 14. In addition, for each photograph a second ‘doctored’ version was created. This version was the same in all respects to the first, with the exception of the removal of Olympic branding from the image. This modification was achieved using Adobe Photoshop Elements™. These doctored photographs form the stimuli of the ‘Olympic branding absent’ condition and can also be seen in the right-half of Figure 14. In total, six photographs - three with Olympic branding and three without - were available for use in the survey.
Figure 14. Olympic branded and non-branded products. The products in image a, c, and e comprise the stimuli of the Olympic branding present condition. The products in image b, d, and f comprise the stimuli of the Olympic branding absent condition.

4.6 Procedure

Written instructions and a consent form were presented to the participants at the start of the survey. On gaining consent, a randomising code embedded within the survey directed participants to one of the six product photographs. A photograph of the product appeared alone and in the centre of the screen for a duration of 20 seconds, after which time a ‘pop-up-box’ appeared on the screen instructing participants to progress to the next page. Here the participants were presented with three questions relating to the product they had just viewed. These questions required the participants to “estimate the amount of fat/sugar/calories contained in
the product you have just viewed” by using the numbers on the keyboard to type their estimates into the boxes onscreen. To assist participants with their estimates, guidance was provided for each of the three nutritional measures in the form of daily recommended allowances (DRA). In order to ensure that participants in the Olympic branding present condition had taken note of its presence, all participants were shown images of the ‘London 2012’ and ‘Olympic Rings’ logos and required to indicate whether one or other of these logos had been present on the product they viewed. They were also asked to enter the ‘company, organisation or event these logos represent’ into the appropriate box on the screen. Finally, in order to identify any meaning the participants attached to the Olympic branding, they were asked indicate their agreement to the statement “Food and drinks that bear the logo of the Olympic Games are required to be nutritious and healthy”, on a 7-point Likert scale, with 1 indicating that they ‘strongly disagree’ and 7 indicating that they ‘strongly agree’ with the statement. If participants neither agreed nor disagreed with the statement they were asked to indicate this by selecting 4. This rating allowed for the identification of any potential association the participant holds between the Olympic branding and healthy eating. Demographic data was collected and the participants were thanked for their participation. A copy of the survey can be seen in Appendix I.

4.7 Initial Data Screening

To determine the effect of Olympic branding on participants’ estimates of the nutritional values of the products, it was necessary to ensure that the remaining participants’ in the Olympic branding present condition noticed the presence of this branding on the product they viewed. During the survey participants were given 20 seconds to view the product image. Any participant who failed to view the product image for the required 20 seconds was removed from the sample as it was uncertain whether they would have had adequate time to notice the presence of the Olympic branding. As a further means of ensuring that participants’ in the ‘Olympic branded’ condition had noticed the presence of the Olympic logo on the product they viewed; participants’ were asked to confirm its presence by checking a box next to the image of either the ‘London 2012’ logo or the ‘Olympic Rings’. Participants’ in the Olympic branding present condition who had failed to correctly confirm the presence of an Olympic logo were removed from the sample. Those removed included; 7

108
participants’ who failed to notice the ‘London 2012’ logo on the branded McChicken® Sandwich, 6 participants’ who failed to notice the ‘London 2012’ logo on the branded Cadbury flake and 2 participants’ who failed to notice the ‘Olympic rings’ logo on the branded Coca-Cola can. The data was also screened to ensure that those participants in the Olympic branded present condition correctly identified that these logos were associated with the Olympic Games.

Next inspection boxplots identified extreme outliers in the Olympic branding present and Olympic branding absent conditions. The following outliers were removed from the sample; two outliers were removed from the McChicken® Sandwich (non-branded) condition and 3 from the McChicken® Sandwich (Olympic branded) condition. Five outliers were identified and removed from the Flake (non-branded) condition and a further 2 outliers were removed from the Flake (Olympic branded) condition. Finally, 3 outliers were identified and removed from the Coca-Cola (Olympic branded) condition, and a further 5 outliers were removed from Coca-Cola (non-branded) condition. This left a final sample of 279 participants.

On completion of the initial data screening, a Kolmogorov-Smirnov test was performed to test for a normal distribution for each of the 18 nutritional estimates (3 product x 2 branded/non-branded x 3 nutritional measures). However, the results of the Kolmogorov-Smirnov tests indicate that 15 of the 18 nutritional estimates were significantly different from the normal distribution at the \( p < .05 \) level. The remaining 3 were, the estimates for the number of calories in a non-branded Flake \( (D[38] = .124, p > .05) \), participants estimates of the grams of sugar in the Olympic branded Flake \( (D[38] = .127, p > .05) \), and participants estimates of the number of calories in a can of Olympic branded Coca-Cola \( (D[38] = .136, p > .05) \). To test for homogeneity of variance a Levene’s test was performed. For this test the data from the Olympic branding present and Olympic branding absent conditions were combined for the nutritional measures of the three products. The results of the Levene’s test show there to be a significant difference in variances across all three measures, (Fat; \( F[2, 276] = 103.8, p < .001 \), Sugar; \( F[2, 276] = 28.1, p < .001 \), and Calories; \( F[2, 276] = 66.6, p < .001 \)).

As the data was to be analysed using a MANOVA, it was decided to perform a \( \log_{10} \) transformation to correct for the problems with normality and the
assumptions of homogeneity of variance. The data was transformed for all three nutritional measures across all conditions.
RESULTS

4.7 Data Analysis

Participants’ responses were collected using the survey software, Sawtooth™. These responses were initially exported to MS EXCEL for initial data screening, and then to SPSS version 20 (IBM Corp., 2011) for analysis.

Data were analysed in the following ways.

(i) Differences in participants’ estimates of the nutritional values for the three products were assessed using a Multivariate Analysis of Variance (MANOVA);

(ii) The effect of product on participant’s estimates of nutritional values was assessed using an univariate ANOVA and Levene’s test for equality of variance as appropriate;

(iii) Differences in participants’ estimates of the nutritional values for the three products were assessed using a Kruskal-Wallis test;

(iv) The effect of participant demographics (gender and age) on estimates of nutritional values was assessed using six repeated measures ANOVAs.

(v) The relationship between Olympic branding and health was assessed using a Pearson’s Chi-Squared test.

4.8 Testing for the Effects of Olympic Branding on Estimates of the Nutritional Values of Products

In order to test for the effect of Olympic branding on participants’ estimates of the nutritional values of the 3 food and drink products, a MANOVA was performed. The results of Pillai’s trace suggests that there was no significant effect of Olympic branding on participants’ estimates of the nutritional values of the products, \(V = .001, F[3, 271] = .135, p > .05\). That is to say, the presence of the Olympic Logo on the product’s packaging did not significantly influence participants’ nutritional estimate. If the Olympic branding were as predicted, acting in a similar way to other general health logos (e.g., Carrillo et al., 2014, Saba et al., 2010), or the function images used in Studies 1 and 2, then I would have expected to find a significant difference between participants’ estimates when the Olympic
branding was present on the product’s packaging compared to when it was absent. In addition, the results of Pillai’s trace further suggest that there was a significant effect of product on estimated nutritional value, \( V = 1.2, F[6, 554] = 129.6, p < .05 \). Separate univariate ANOVAs confirmed the effect of product on participants estimated nutritional values, \( \text{Fat; } F[2, 273] = 595.7, p < .05, \text{Sugar, } F[2, 273] = 21.7, p < .05, \text{Calories, } F[2,273] = 178.3, p < .05 \). This result was however to be expected as it suggests that participants rightly perceived the different products – a McChicken® Sandwich burger, Flake chocolate bar and Coca-Cola drink - to have different nutrient contents. These variations in nutritional estimates between products can be seen in Table 2, which shows participants’ estimates for each of the products alongside the actual nutrition values of the products. It should, however, be noted that for this analysis the assumption of homogeneity of variance is not met as shown by the result of Box’s test of equality of covariance matrices, \( \text{Box’s } M = 108.77, p < .001 \). In addition, the Levene’s test performed on each of the three transformed nutritional measures found that the transformed estimates of sugar content still violated the assumptions of this test, \( F[5, 273] = 2.9, p = .564 \). The Levene’s test did however reveal a non-significant result for transformed estimates of fat content, \( F[5,273] = 1.47, p > .05 \) and for transformed estimates of calories content, \( F[5, 273] = .78, p = .56 \).

In light of these findings it was decided to retest the data using a Kruskal-Wallis test. The results of the Kruskal-Wallis test show there to be a significant effect of product on participants’ estimated nutritional values, \( \text{Fat, } H[2] = 223.8, p < .001, \text{Sugar, } H[2] = 45.4, p < .001, \text{Calories, } H[2] = 176.5, p > .001 \). These findings therefore confirm those of the original MANOVA. In addition the Kruskal-Wallis tests found that participants’ estimated nutritional values were not affected by the presence of Olympic branding, \( \text{Fat, } H[1] = .576, p > .05, \text{Sugar, } H[1] = .142, p > .05, \text{Calories, } H[1] = 1.06, p > .05 \). Again, this finding confirms those of the original MANOVA for the variable Olympic branding. As the findings of the Kruskal-Wallis test are in line with those of the original MANOVA, post hoc tests were not performed.
Table 2. Mean estimates and actual nutritional values by product

<table>
<thead>
<tr>
<th>Product Name (Condition)</th>
<th>Actual Fat in product (grams)</th>
<th>Mean estimate of fat in product (grams)</th>
<th>Actual Sugar in product (grams)</th>
<th>Mean estimate of sugar in product (grams)</th>
<th>Actual Calories in product (Kcals)</th>
<th>Mean estimate of calories in product (Kcals)</th>
</tr>
</thead>
<tbody>
<tr>
<td>McChicken® Sandwich a</td>
<td>16.00</td>
<td>55.97</td>
<td>7.00</td>
<td>6.22</td>
<td>385.00</td>
<td>803.40</td>
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<td>(Olympic branding absent)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>McChicken® Sandwich a</td>
<td>16.00</td>
<td>52.44</td>
<td>7.00</td>
<td>30.85</td>
<td>385.00</td>
<td>728.02</td>
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<td>(Olympic branding present)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flake b</td>
<td>9.90</td>
<td>9.11</td>
<td>17.70</td>
<td>16.27</td>
<td>170.00</td>
<td>213.75</td>
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<td>(Olympic branding absent)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flake b</td>
<td>9.90</td>
<td>12.10</td>
<td>17.70</td>
<td>17.33</td>
<td>170.00</td>
<td>216.88</td>
</tr>
<tr>
<td>(Olympic branding present)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coca Cola c</td>
<td>0.00</td>
<td>0.95</td>
<td>35.00</td>
<td>18.16</td>
<td>139.00</td>
<td>260.00</td>
</tr>
<tr>
<td>(Olympic branding absent)</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coca Cola c</td>
<td>0.00</td>
<td>1.33</td>
<td>35.00</td>
<td>17.39</td>
<td>139.00</td>
<td>227.56</td>
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<td>(Olympic branding present)</td>
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</tbody>
</table>

4.9 Testing for the Effects of Participant Demographics on Estimates of the Nutritional Values of Products

Additional statistical analysis was conducted to determine whether participants’ demographics – specifically, their gender and age - influenced estimates of the nutritional value of products.

4.9.1 Gender. To examine whether participants’ gender had an effect on their estimates of the fat, sugar and calorie values of the products, three 2(Gender: Male vs. Female) x 2(Olympic Branding: Present vs. Absent) x 3(Product: McChicken Sandwich vs. Flake vs. Coca-Cola) repeated measures ANOVAs were conducted.

4.9.1.1 Fat. The results of the analysis for the participants’ estimates of fat indicate that there was no significant interaction between the product the participants viewed and their gender, suggesting that there was no difference in male and female estimates of the products fat content, \( F[2, 10] = 2.10, p = .17, \eta_p^2 = .30 \). Furthermore, the analysis revealed no significant interaction between branding and gender, suggesting that male and female estimates of fat content did not differ significantly in the presence or absence of Olympic branding, \( F[1, 5] = .021, p = .89, \eta_p^2 = .004 \). The analysis revealed no significant three-way interaction between product, branding and gender, \( F[2, 10] = .78, p = .485, \eta_p^2 = .135 \).

4.9.1.2 Sugar. The analysis revealed there to be no significant interaction between product and gender, and so suggests there to be no difference between male and female participants’ estimates of the sugar content of the products, \( F[2,10] = 1.12, p = .37, \eta_p^2 = .18 \). In addition, the analysis found no significant interaction between branding and gender, again suggesting that participants did not differ in their estimates when the Olympic branding was present or absent, \( F[1,5] = .81, p = .41, \eta_p^2 = .139 \). The analysis revealed no significant three-way interaction between product, branding and gender, \( F[2, 10] = 4.49, p = .04, \eta_p^2 = .47 \).

4.9.1.3 Calories. The results of the ANOVA for participants’ estimates of calories revealed no significant interaction between product and gender \( F[2, 10] = .69, p = .52, \eta_p^2 = .12 \). The analysis also revealed there to be no significant interaction between branding and gender, \( F[2, 5] = 1.79, p = .24, \eta_p^2 = .26 \). There was however, a significant three-way interaction between product, branding and
gender, \((F[2,10] = 5.50, p = .024, \eta^2_p = .52)\) explained by a significant interaction between product and branding, \((F[2, 10] = 4.99, p = .03, \eta^2_p = .50)\).

**4.9.2 Age.** To determine whether participant age had an effect on their estimates of the nutritional value of products, responses were first coded into Age 1 – participants aged 14 – 45 years and Age 2 – participants aged 46 – 79 years. Two categories were chosen as more would have greatly reduced the number of responses per conditions. Next, three, \(2\) (Age: Age 1 vs. Age 2) x \(2\) (Olympic Branding: Present vs. Absent) x \(3\) (Product: McChicken Sandwich vs. Flake vs. Coca-Cola) repeated measures ANOVAs were conducted.

**4.9.2.1 Fat.** The results of the analysis for participants’ estimates of fat found there to be no significant interaction between product and age, suggesting participants estimates of products’ fat content did not differ by age, \((F[2,18] = .01, p = .99, \eta^2_p = .00)\). Furthermore, the analysis revealed there to be no significant interaction between branding and age. That is, the age of the participant did not influence their estimate of fat when the Olympic branding was present or absent on the product packaging, \((F[1,9] = .53, p = .49, \eta^2_p = .06)\). Finally, no significant three-way interaction was found, \((F[2,18] = .678, p = .52, \eta^2_p = .07)\).

**4.9.2.2 Sugar.** The results of ANOVA for participants’ estimates of sugar revealed no significant interaction between the type of product seen and the age of the participant, \((F[2, 18] = .65, p = .53, \eta^2_p = .07)\). There was also not significant interaction between branding and age, \((F[1, 9] = 3.30, p = .10, \eta^2_p = .27)\). The analysis found no significant three-way interaction, \((F[2, 18] = 1.47, p = .26, \eta^2_p = .14)\).

**4.9.2.3 Calories.** For participants’ estimates of calories, the analysis indicated that there was no significant interaction between product and age, \((F[2, 18] = .24, p = .79, \eta^2_p = .03)\). There was also no indication of a significant interaction between branding and age, \((F[1, 9] = 1.92, p = .20, \eta^2_p = .18)\). Again, no significant three-way interaction was found, \((F[2, 18] = 2.63, p = .10, \eta^2_p = .23)\).

**4.10 Relationship Between Olympic Branding and Health**

The statistical analysis outlined in the previous section has demonstrated that the presence of Olympic branding on the product’s packaging has no significant
effect on participants’ estimates of the nutritional value of the products. However, in order to fully understand this finding it is essential we know whether the Olympic branding itself carries any implicit meaning to the viewer that would result in a change in their estimates of the product’s nutritional values. In short, are the Olympic logos acting as health claims insofar as they are priming participants’ expectations as to the healthfulness of the product? To this end, participants were asked to rate, on a 7-point Likert scale, their level of agreement to the statement “Food and drink that bear the logo of the Olympic Games are required to be nutritious and healthy”. It was hypothesized that if participants were indeed drawing health related inferences from the Olympic branding then agreement with this statement would be greater. For the benefit of the analysis participants’ ratings were combined to form the three categories ‘disagree, neither agree nor disagree, and agree’, (Ratings 1 and 2 were combined to form the category ‘disagree’; ratings 3, 4 and 5 were combined to form the category ‘neither agree nor disagree’; and ratings 6 and 7 to form the category ‘agree’).

A Pearson’s chi-square was performed on the data and the analysis revealed there to be a significant association between Olympic branding and participant’s rating in response to the statement, ($\chi^2 [2] = 21.21, p < .001$). Specifically, agreement from participants in the Olympic branding present condition was 26.9%, compared with the 73.1% agreement from participants in the Olympic branding absent condition. This finding runs contrary to the hypothesized direction. That is, these findings suggest that participants are indeed using the Olympic branding present on the products packaging to draw inferences as to its healthfulness. However, rather than increasing their perception of the products’ healthfulness, the imagery is decreasing it. In addition, the analysis revealed no significant association between product and agreement with the statement, ($\chi^2 [4] = 0.47, p > .05$), suggesting that the product the participant viewed had no significant effect on judgment.
DISCUSSION

The findings of this study indicate that the presence of Olympic branding on the packaging of sponsors’ products does not significantly affect participants’ perception of the ‘healthiness’ of that product in terms of estimates of fat, sugar and calorie content. In short, the Olympic logos did not act as a health claim insofar as they failed to influence participants’ expectations of the products health benefits.

One possible explanation for this finding is that the participants simply failed to formulate an association between the logo on the product’s packaging and the ideals and values of the Olympic movement. That is, although participants noticed the logo and recognised it as signifying the Olympic Games, they may have either failed to associate any meaning to the logo, and thus saw it purely as a decorative packaging element, or otherwise associated it with alternative attributes of the Games. The assumption underlying the effectiveness of Olympic branding as a general health logo is that people associate it with the Olympic ideals of ‘health, fitness and wellbeing’. However, with a complex and multifaceted brand, such as the Olympics, it is possible that participants associated other attributes, such as ‘achievement, determination, peace or friendship’ with the logo.

Another explanation is that the participants held strong pre-existing schemas about the Sponsor’s products and their healthiness. That is, the participants hold in their memories pre-existing schemas and expectations about the Olympic Games, the Sponsors and their products. These schemas and expectations may derive either from the individual’s direct prior experiences with the Games, Sponsors and products, or indirectly through exposure to previous advertising, media or the word of family and friends, or from a combination of both. Thus when a participant views a product - such as a McChicken® Sandwich displaying Olympic branding on it’s packaging - multiple existing schemas are evoked. Not only will a schema be evoked for the viewed product (i.e., the McChicken® Sandwich), but schemas will also be evoked for the Sponsor (McDonalds) and for the Olympic Games itself. The viewed information will then be evaluated against the schemas, and if the information is deemed to be consistent with the schemas, a positive evaluation will result. Previous research has suggested that consumers have a preference for congruent stimuli, as it allows them to engage in more fluent or heuristic processing.
(e.g., Van Rompay et al., 2009, Van Rompay & Pruyn, 2008). This, in turn, leads to feelings of positive affect towards the stimuli – in this case, the Sponsor’s product. However, a perceived inconsistency, such as that between the evoked schemas for the product (i.e., “this product is an unhealthy snack food”) and the Sponsor object (i.e., “the Olympic Games represents health and fitness”), may lead to disfluency and thus result in more elaborative processing. Participants’ responses to the statement “food and drink that bear the logo of the Olympic Games are required to be nutritious and healthy” is indicative of such elaborative processing. If the Olympic logos were acting as general health logos then it would be expected that participants would respond in agreement to this statement. However, even in the event that participants did associate the Olympic branding with health and fitness, this may not have been sufficient to override their pre-existing schemas as to the healthiness of the product.

In terms of evaluative conditioning, the relationship between Sponsor Object and Sponsor would be a success as the positive attributes of the Sponsor Object – the Olympic Games – would be projected onto the Sponsor. However, the study data suggest this not to be the case. It was in fact found that participants who viewed an Olympic logo on the product packaging were significantly more likely to disagree with this statement. This suggests that participants are using their pre-existing knowledge of the Sponsor, the product and its ‘healthiness’ to formulate a more evaluative response to the statement. In terms of evaluative conditioning, this suggests that the negative attributes of the Sponsor and their product are being transferred onto the Olympic brand.

4.11 Methodological Limitations

Another noteworthy finding from this study relates to participants’ estimates for the nutritional content of the Sponsors’ products. While participants were given guidance as to the daily recommended allowances of fat, sugar and calories for both males and females, the results of this study indicate that participants’ estimates of fat and sugar content differed significantly from the actual values for all three products. Participants’ estimates of the calorie content of the products significantly differed from the actual values for the McChicken® Sandwich and Coca-Cola, but estimates did not significantly differ for the Cadbury’s Flake. These findings suggest that,
regardless of any branding present participants were unable to make accurate judgements as to the nutritional content of the products. It may be considered a limitation of this study that - even with guidance - participants were unable to make accurate judgements regarding the products’ nutritional content. Any similar replications should therefore consider using an alternative measure of healthiness.

This study – like Studies 1 and 2 before it – employed a direct measure of understanding. That is, participants were asked directly about their beliefs and inferences. Whereas such an approach offers valuable insights into the role of packaging imagery in people’s understanding of health information, it also suffers some limitations. For example, it may be the very act of questioning that actually prompts them to draw inferences. In this study, and also in Studies 1 and 2, participants were asked to ‘study’ the product packaging, as they would be questioned on it. This method might therefore lead to an overestimation of the influence of packaging imagery, because the consumer might rarely infer information from this imagery unless overtly prompted to do so. Or they might underestimate the influence of packaging imagery, by failing to adequately capture participants’ implicit inferences. The following studies therefore aim to overcome this limitation through the use of a novel memory-based method to explore how packaging imagery affects people’s inferences as to the health function of products.

4.12 Conclusion

In conclusion, the findings of this study suggest that Olympic branding does not significantly affect people’s perceptions of the healthiness of the Sponsors’ products; a meaningful finding given the concerns levelled at the Games organisers. Furthermore, this study also brings into question the possibility of generic health logos acting as effective visual health claims – an important notion given the assertion made in current EC legislation – as well as the possible effectiveness of adding health information onto established products and brands. This study was however not without its limitations, including those arising from the use of a direct measure. The followings studies will therefore explore how packaging imagery influences people’s expectations as to a product’s function through the use of a novel indirect memory-based measure.
CHAPTER FIVE

1STUDY 4: Investigating the Effects of Function Images on Recognition of Health Claims: A Novel Memory-Based Measure

5.1 Chapter Overview

Data from Studies 1 and 2 suggest that the images present on product packaging prime consumers’ expectations as to products’ function and thus act as health claims. However, Study 3 cautions against generalising these findings to all types of health imagery. In addition, it can be considered a limitation of these studies that they employed direct measures. The current study aims to overcome this limitation through the use of a novel memory-based method to investigate the role of function images in people’s understanding of health claims for fictitious dietary supplement products.

5.2 Introduction

The data from Studies 1 and 2 suggest that people are indeed using packaging imagery – specifically, function images – to draw inferences as to the product’s health function. In Study 1, the data indicated that health claims shown alongside packaging displaying a congruent function image, were rated as more believable by the viewer than when the function image was incongruent with the health claim, or absent from the packaging. Study 2, built on the findings of Study 1 by showing that the presence of a function image can increase people’s perception as to the possible benefits of consuming the product for its intended function. These findings are in accordance with the small body of previous research that suggests images can act as health claims (e.g., Carrillo et al., 2014, Saba et al., 2010). These findings further support the assertion in current legislation which suggests that images can qualify as health claims, however the findings from Study 3 caution against such a broad assertion by suggesting that general health logos on established products may be insufficient to alter people’s perception as to the healthfulness of the product.

1Study 4 is included within the following publication:
The previous three studies in this thesis - together with previous research in this area – have all utilised direct measures of consumer understanding.

Such measures are, however, not without their limitations - as I discussed in Chapter One. For instance, this direct approach only tells us what inferences people draw, and what attitudes they activate, when they are overtly prompted to report beliefs and attitudes. It is therefore plausible that, in some cases, it could be the act of questioning that prompts these cognitions, rather than their being spontaneous. In other words, a consumer with no prior expectations about a product’s health benefits might nevertheless, when asked what they think the product is for, quite quickly formulate and report such an expectation. This is an important issue to address if we wish to assess the understanding of average consumers who – as typically the case – are unprompted to reflect on their inferences and beliefs. A further limitation of direct measures is that questioning relies on people having conscious access to – and thus being capable of accurately reporting – their beliefs and cognitions (Sheeran, Gollwitzer, & Bargh, 2013). This reliance is not always warranted, and numerous studies show that persuasive influence can occur without the recipient’s conscious awareness (Fitzsimmons et al., 2002, Strahan, Spencer, & Zanna, 2002).

Further evidence that people’s self-reports can insufficiently index their understanding and beliefs comes from various studies involving indirect measures. Indirect measures are those whereby the presence or strength of a particular belief, attitude or expectation (for example) is inferred not through direct questioning, but through measuring proxy variables known to be influenced by these cognitions; typically, speed categorization tasks. One of the most frequently cited examples is the Implicit Association Test (IAT), whereby biased altitudes are implicitly identified via response time measures (Nosek et al., 2011, Greenwald et al., 1998). Other prominent examples of indirect measures are outlined in Chapter One. Research has shown that data derived from indirect measures reveal associations that often go unreported in direct tests (e.g., Frise, Wanke, & Plessner, 2006), and that contribute well to the ability to predict behaviour (Maison, Greenwald, & Bruin, 2004). Yet notwithstanding their obvious advantages, indirect measures are not without their limitations, particularly when it comes to furthering our understanding of the role that images play in people’s perception of the health function of products. For instance, the propensity of these measures to implement rapid presentation of
stimuli greatly reduces the complexity of stimuli that can be employed – often to only single words or images. Thus it would be impractical to apply the type of stimuli used in Studies 1, 2 and 3 – and therefore the type of packaging experienced by consumers in a real word setting - to existing indirect measures.

There is little doubt that indirect measures could afford an important insight into the role of packaging imagery on consumers’ beliefs as to the product’s function. However, current measures are somewhat limiting. The present study therefore aims to apply a novel indirect memory-based method to assess how images promote inferences about the health properties of products.

5.3 Memory as an Indirect Method

In Chapter One, I discussed the use of memory measures as a promising indirect approach to address questions about the effects of packaging imagery on consumers’ beliefs. Such measures have already been acknowledged by advertising researchers as being invaluable for implicitly assessing people’s yielding to persuasive influence (Braun – LaTour & Zaltman, 2006). Furthermore, it has been well established, through empirical research, that memory is labile. That is, people frequently recall their experiences rather differently from how those experiences truly occurred, and indeed sometimes recall events that never truly occurred at all (e.g., Bernstein, Laney, Morris, & Loftus, 2005, Roediger & McDermott, 1995).

Within this broad literature, there is considerable evidence that people’s expectations and inferences shape their memories. For instance, in a study by Garry, Strange, Bernstein, and Kinzett (2007) participants read a newspaper article about a devastating hurricane, which was accompanied by a photograph of a village taken either before or after the hurricane struck. On a subsequent memory test, those in the ‘after’ condition were substantially more likely to remember reading about injuries and deaths, even though no such detail was either reported in the article or evidenced in the photograph. According to the source-monitoring framework (Johnson et al., 1993), expectations can distort memory because they promote thoughts and mental images which, when later retrieved, feel much like memories of real experiences. For instance, if a product’s packaging makes a person think about heart health, then when they later attempt to recall the claims they saw, positive claims about heart function should come to mind easily and clearly with a strong sense of familiarity.
These memory – like characteristics might then lead them to incorrectly believe they saw those claims before, rather than having only thought about them. Whereas awareness of how expectations shape memory has informed scientific theories of human remembering considerably, a less obvious implication of this relationship is that studying what people remember can inform us about their expectations. Put differently, studying the memory errors people generate in certain contexts can offer insight into the beliefs and inferences that those people must have formed, in order for those errors to occur. Such an approach could go beyond the reach of explicit measures in assessing how consumers interpret health imagery.

5.4 Aims

This study aims to utilise a novel indirect memory-based methodology as a means by which to overcome the limitations associated with direct measures, and current rapid presentation indirect measures. Through the analysis of resulting memory errors, this study aims to assess how imagery on products’ packaging influences people’s beliefs and inferences as to the health properties of those products. Specifically, it aims to investigate whether the presence of function images on packaging of fictitious dietary supplements would produce recognition errors for associated health claims in the viewer. It is predicted that if function images lead participants to deliberately or spontaneously make health-related inferences, then participants would falsely recognize unseen claims that follow from those inferences. For example, if a heart image is present on the products’ packaging, it is hypothesized that its presence may lead participants to infer that the product is ‘beneficial to heart health’ and thus, when asked, falsely claim that they recognize congruent heart health claims.
5.5 Participants

Thirty-six University of Surrey students (31 females and 5 males, mean age = 19.60, SD = 1.74, range = 18-28) took part in this study. Eligible undergraduate students received remuneration in the form of a lab token for their participation. Participants who had previously taken part in study one were excluded from participation.

5.6 Design

This study took the form of a single-session laboratory experiment of approximately 40 minutes duration. The experiment followed a 2(Function Image: Present vs. Absent) x 3(Written Health Claim: Related vs. Unrelated vs. Critical) repeated measures design. The dependent variable was the proportion of critical claims that participants indicated that they recognized. A measure of participants’ metacognitive appraisal of this recognition was also taken. The experiment itself took the form of an individual computer based task consisting of an encoding phase and a recognition phase. The Psychology Software Programme E-Prime™ was used both for the presentation of stimulus materials and for data collection.

5.7 Materials

5.7.1 Dietary supplement packaging. This experiment used the same stimulus set of dietary supplement packaging as Study 1.

5.7.2 Written health claims. A stimulus set of 14 written health claims (6 x Related, 6 x Unrelated, 2 x Critical) was created for each of the six fictional products. Thus a total of 84 claims were created for use in this study.

5.7.2.1 Related Claims (non-critical claims). Six of these written health claims made direct reference to some aspect of the product’s packaging, but not to the health function implied by the function image on the image-present packaging (e.g., Contains 150mg of valerian root extract).

5.7.2.2 Unrelated Claims (non-critical claims). A further six of these written health claims were ‘unrelated health claims’ that made no direct reference to either the health function implied by the function image, or to any aspect of the packaging
(e.g., Provides nutritional support for those aged 50 years +). Together the 12 related and unrelated health claims will be referred to as the *non-critical* claims.

5.7.2.3 **Critical Claims.** The final two written health claims were of central interest to my hypotheses and are referred to as the *critical* claims. These claims made specific reference to the health function implied by the function image on the product’s packaging (e.g., Supports mental performance and cognitive function).

All the written health claims were adapted from those found on packaging of genuine dietary supplements available for sale in the UK. Adaption was necessary to maintain a consistence of type and length across all the claims. A list of critical claims and non-critical claims used in this study can be found in Appendix M.

5.8 **Procedure**

5.8.1 **Encoding phase.** Participants were seated at a computer for the entirety of the experimental session. After consenting to participate they received written instructions on the screen (see Appendix J for consent form, and Appendix L for participant information sheet). Participants were instructed to study the random exemplar of the dietary supplement packages that appeared on the screen and remained for 10 seconds. Next, eight non-critical written health claims (4 related and 4 unrelated) from the corresponding set appeared sequentially and in random order underneath the label (See Figure 15). Each health claim was displayed for four seconds before being replaced by the next. Participants were again instructed to carefully study these claims. After the eighth written health claim had disappeared from the screen, participants were instructed to complete a one-minute filler task – a series of anagrams – on the accompanying paper worksheet. After this time the participant was instructed to refocus on the computer screen. At this point a new supplement package appeared, and the encoding procedure described above was repeated for the remaining five packages. During this phase, each participant saw three image-present packages and three image-absent packages in a random order; the assignment of packages to image condition was counterbalanced across participants.

5.8.2 **Recognition phase.** On completing the encoding phase, the recognition phase began. On-screen instructions outlined the task for the participants. Participants were once again shown the same six packages they saw in the encoding
Figure 15. Screenshot of the encoding phase task from Study 4. Exemplar shows an image-present, unrelated claim pairing from the health category heart function.

Figure 16. Screenshot of the recognition phase task from Study 4. Exemplar shows an image-present, unrelated claim pairing from the health category heart function.

Have you previously seen this image and statement pair?

If the answer is ‘yes’, press ‘y’
If the answer is ‘No’, press ‘N’

You indicated that you saw the image and statement pair previously. Please...

Press 1 if you REMEMBER specific details of seeing the statement and image on the screen.
Press 2 if you KNOW you’ve previously seen the statement and image, but CANNOT bring to mind any specific details of seeing them on the screen.
Press 3 if you are just making a GUESS

Figure 17. Screenshot of the instructions given to participants for the metacognitive appraisal task undertaken during the recognition phase of Study 4.
Figure 18. Diagram of the overall procedure used in Study 4.
phase, one by one and in random order. This time, the package was presented alongside a series of ten written claims (2 x novel related claims, 2 x previously seen related claims, 2 x novel unrelated claims, 2 x previously seen related claims, 2 x novel critical claims), randomly selected from the stimulus set of 14 claims (See Figure 16). As each claim appeared sequentially, participants were required to make a recognition judgment by indicating whether or not they had seen that claim made with reference to that particular product. That is to say, participants were asked to indicate, using the computer keyboard, whether they had previously seen the package and written health claim as a pairing during the encoding phase, by pressing the ‘y’ key for ‘yes’ and the ‘n’ key for ‘no’. Whenever participants pressed ‘y’, they were asked to make a Remember/Know/Guess (R/K/G) judgment (Gardiner, Ramponi, & Richardson-Klavehn, 1998). Specifically, participants were asked to press ‘1’ on the keyboard if they could remember specific details of seeing the label and claim pairing on the screen, to press ‘2’ if they knew they had previously seen the claim paired with the packaging, but did not explicitly remember seeing them, or to press ‘3’ if they were guessing (See Figure 17).

On completing the recognition phase, participants were shown the six function images in isolation from any packaging context and asked to indicate whether they recognized any of the images as being from a genuine product. None of the participants indicated that they recognized any of the images as deriving from genuine dietary supplement packaging. This measure was included to ensure that participants’ recognition of claims was not based on their prior knowledge of the genuine products from which these function images were taken. Finally, participants recorded their age and gender before being thanked and debriefed (see Appendix K for debrief statement). A diagram of the experimental procedure is shown in Figure 18.

5.9 Ethics

This study received a favourable opinion from the University of Surrey Ethics committee. A letter confirming this can be found in Appendix D.
RESULTS

5.10 Data Analysis

Participants’ responses were collected using the Psychology Software Programme E-Prime™. These responses were analysed using SPSS version 21 (IBM Corp., 2012).

Data were analysed in the following ways.

(i) The proportion of falsely recognised critical claims was calculated for each participant. Differences in recognition of critical claims was assessed using a paired sample t-test;

(ii) Differences in participants’ subjective judgements (Remember, Know, Guess) were assessed using a series of paired sample t-tests. A Wilcoxon test was performed to confirm findings;

(iii) Differences in participants’ recognition of non-critical claims was assessed using a within-subjects analysis of variance (ANOVA);

(iv) Recognition accuracy was calculated for non-critical claims;

(v) Differences in participants’ true - or correct - recognition of health claims was assessed using a within-subjects ANOVA.

5.11 Recognition of Critical Claims

The aim of this study was to examine the extent to which adding function images to the products’ packaging led participants to believe they read health claims that were potentially implied by these function images (i.e., critical claims). To this end, the proportion of critical claims falsely recognised (out of 6 per condition – 3 packages x 2 claims) was calculated for each participant. A paired t-test confirmed that participants were significantly more likely to falsely recognise critical claims in the function image-present condition compared with the function image-absent condition ($M_{\text{present}} = .29$, $SD = .26$, $M_{\text{absent}} = .13$, $SD = 0.17$, $t[35] = 3.57$, $p < .01$, $d = 0.62$). This finding suggests that the presence of an image on a product’s packaging, that implied a health function, frequently led participants to falsely recognise health
claims consistent with the implied function. This can be clearly seen in the first column of Figure 19.

5.12 Recognition of Non-Critical Claims

Further analysis was conducted to examine whether the presence of function images affected participants’ false recognition for novel non-critical claims. No specific prediction was made as to an effect in this condition, thus this analysis was merely exploratory. To this end, a 2(Function Image: Absent vs. Present) x 2(Written Health Claim: Related vs. Unrelated) within-subjects analysis of variance (ANOVA) was performed. This analysis revealed a non-significant main effect of image, \(F[1,35] = 0.13, p = .72, \eta_p^2 = .00\). That is to say, participants were no more likely to falsely recognise non-critical claims in the image-present condition than in the image-absent condition. There was however a significant main effect of health claim type, \(F[1,35] = 126.43, p < .01, \eta_p^2 = .78\) and - as can be seen in Figure 19 - participants were significantly more likely to falsely recognise related claims compared to unrelated claims. These errors however, were not driven by the presence of function images. The interaction between factors was also found to be non-significant, \(F[1,35] = .05, p = .83, \eta_p^2 = .00\).
5.13 Subjective Judgements for Critical Claims

During the recognition phase of this experiment, participants who indicated that they had previously seen a product packaging and written health claim pairing were asked to make a subjective (Remember, Know, Guess) rating, indicating their metacognitive appraisal of this recognition. Of most interest to my hypothesis was whether the false recognition was driven by high-confidence errors or by mere guessing. To this end, I calculated the number of ‘remember, know and guess’ responses given by each participant in both the image-present and image-absent conditions. The effect of function image on participants’ false recognition of critical claims was not driven significantly by increases in guessing ($M_{\text{present}} = .10, SD = .15, M_{\text{absent}} = .05, SD = .10, t[35] = 1.68, p = .10, d = 0.28$). Further examination of the ‘remember’ and ‘know’ responses suggests that the presence of a function image increased ‘know’ responses ($M_{\text{present}} = .15, SD = .18, M_{\text{absent}} = .06, SD = .13, t[35] = 2.62, p = .01, d = 0.45$), but did not significantly increase ‘remember’ responses ($M_{\text{present}} = .05, SD = .10, M_{\text{absent}} = .02, SD = .07, t[35] = 1.22, p = .23, d = 0.26$). In sum, although function images increased the proportion of ‘remember, know and guess’ responses overall, only the increase in ‘know’ responses reached statistical significance. Given the small frequencies in many of the cells in these analyses, nonparametric Wilcoxon tests were performed on the data. This analysis replicated the findings from the parametric analysis.

5.14 Subjective Judgements for Non-Critical Claims

The subjective judgment data refute the possibility that the false recognition effects were driven purely by patterns of guessing, yet one counterexplanation is that participants were reluctant to admit too often that they were guessing, and instead reported many of their guesses as ‘know’ or ‘remember’ responses. Recognition accuracy data for the noncritical claims help to tackle this explanation. If accuracy for these claims were at chance levels (i.e., 50%), this would indicate that participants remembered the claims very poorly, and were therefore adopting a pure guessing strategy even if not saying so. If accuracy were substantially above 50%, this would imply stronger memory representations and therefore help rule out this guessing interpretation. In this study, recognition accuracy across all noncritical
claims was 73%, indicating that participants remembered the claims reasonably well and were not consistently guessing.

5.15 True Recognition

Although my hypothesis related only to participants’ false recognition of health claims, for completeness I also examined the extent to which the addition a function images to the product’s packaging influenced participants’ correct or ‘true recognition’ of health claims. I therefore performed a further 2(Function Image: Absent vs. Present) x 2(Written Health Claim: Related vs. Unrelated) within-subjects ANOVA on participants’ responses to previously seen health claims. The results of this analysis reveal that the addition of function images to product packaging did not significantly affect participants’ true recognition of health claims, ($F[1,35] = 0.31, p = .58, \eta_p^2 = .01$). However, the type of health claims - whether related or unrelated - did significantly influence the accuracy of participants’ recognition for written health claims, ($F[1, 35] = 12.44, p < .01, \eta_p^2 = .26$). There was however, no significant interaction between type of health claim seen by the participants and addition of function images on product packaging, ($F[1,35] = 0.24, p = .63, \eta_p^2 = .01$).
DISCUSSION

This study aimed to overcome some of the limitations associated with using direct measures of consumer understanding. This was achieved through the use of a novel indirect memory-based measure. The data from this study suggest that function images on product packaging can, in some cases, prime participants to draw inferences about the health properties of the products. This finding confirms those of Studies 1 and 2, and also fit with other similar studies, such as Carrillo et al. (2014) and Saba et al. (2010), who have also used direct measures of understanding, and support the notion that images can act as health claims. Specifically, the findings from this study indicate that participants falsely recognized health claims that they had not truly read, and that these recognition errors increased significantly when function images present on the products’ packaging could lead the participants to infer the product’s specific health function. In short, the participants created a false memory for the health claims, with function images on products’ packaging acting as a source of suggestion, and thus ‘priming’ the formation of expectations regarding the products’ health function. Furthermore, the Remember/Know/Guess data suggest that these cognition errors were not driven purely by guessing, but rather participants were confident that they had seen these novel written health claims, and in some cases, claimed to actually remember seeing them. This finding that recognition errors were not solely attributable to guesswork, but rather they tended to be accompanied by a ‘know’ response, might suggest that these errors arose from an automatic and spontaneous decision-making process, one that is outside the participants’ conscious control, rather than as an outcome of more controlled and deliberative reasoning. However, further study is required to more fully address whether the consumer decision-making process is an automatic or spontaneous one.

The paradigm presented here sought to resolve many of the problems that have previously constrained the use of indirect measures in this field, such as the restricted choice of stimuli, and in doing so has opened up this area to a myriad of further research. Furthermore, beyond the theoretical implications of these findings, the novel experimental paradigm presented in this study represents an example of how indirect measures might help manufacturers and regulators to quantify the extent to which specific images, graphics and symbols present on product packaging.
may act to (mis)lead consumers, and in turn inform policy as to the use of images as health claims. These ideas are explored further in Chapter 9.

Finally, the data from this study suggest that a memory-based measure can offer a helpful way of assessing the extent to which a product’s packaging can influence consumer understanding, without the need to rely on explicit self-report measures, which may be unreliable, and thus extends on the findings of prior, more direct, research measures.

5.16 Methodological Limitations

Although this novel methodology presents an innovative new way to indirectly assess consumer understanding of health claims, it is in itself limited. For example, although the data indicate there to be there is a significant difference in the absolute number of false memories between the conditions, the size of the overall effect is small. However, it should be noted that the health claims and images used in this study are designed for products in a consumer market place. Thus the proportion of memory errors made by the participants represents a sizable proportion of the consumer population when scaled to a national, or even international level. Furthermore, indirect measures such as this will only ever be able to detect part of the effect. This memory-based paradigm is designed to detect participants’ memory errors only when the resulting inference is make in conjunction with a source monitoring error. Thus participants who may remember the source of the information, and thus recognise that they are making an erroneous inference, may adjust their response from ‘error’ to ‘correct’ before reporting it. Thus the overall effect may be larger than the methodology is able to detect.

Regulation EC 1924/2006 further presents a limitation by stating that claims promoting the health benefits of foods be understandable to the ‘average consumer’ and though the student sample of this study represents a section of the consumer population it cannot be construed as representative of the ‘average consumer’. Thus it will be necessary to apply this paradigm to a more diverse and representative participant sample, before drawing any firm conclusions as to the influence that images have on priming people’s expectations as to the health function of products. Study 7 sees the application of this novel memory-based measure to a consumer sample gathered across five European countries. In addition, the current study uses
function image as a single packaging variable. Products are often found to display multiple elements, including both visual and text-based health claims on their packaging. It would therefore be of benefit to understand further how such elements might interact to influence the inferences formed by consumers; an issue addressed in Study 6. Finally, the ‘remember, know, guess’ data suggest that the inferences drawn by the participants were largely implicit, insofar as guessing did not solely drive the effect. However, further research is needed to address this assumption more directly before it is possible to more confidently conclude whether these inferences are indeed implicit. Thus the following study will aim to address this issue through the use of an explicit warning.

5.17 Conclusions

This study shows via the use of an indirect measure that function images on products’ packaging can act as a source of suggestion, and ‘prime’ the formation of expectations regarding the products’ health function. A finding consistent with that of Studies 1 and 2 and previous research. The data further suggest that these findings are not the result of mere guessing; additional research is therefore needed to determine whether these memory errors result from a conscious and controlled decision-making process, or rather an automatic and spontaneous one. This question will be investigated in study 5 with the use of an explicit warning.
CHAPTER SIX


6.1 Chapter Overview

The data from Study 4 suggest that function images, can in some cases, prime people to draw inferences about the health function of those products. In addition, participants’ subjectivity ratings suggest that these inferences were largely implicit. The aim of the current study is therefore twofold. The first aim was to test the replicability of the effect of function images on false recognition, shown in Study 4. The second aim was to address the extent to which implicit vs. explicit inferences drive these errors. This was achieved through the addition of a forewarning – instructing the participants to avoid being influenced by the function images – to the memory-based methodology used in Study 4.

6.2 Introduction

The results of Study 4 lead to the conclusion that the recognition errors made by participants were not driven purely by guessing; rather the participants were confident that they had previously seen the health claims, and in some cases, claimed to actually remember seeing them. In short, the participants created a false memory for the health claims. Whereas there is no basis on which to argue that the images placed on product packaging are put there to mislead the consumer, the findings of Study 4 do indicate the possibility that these seemingly inert images, in some cases, implicitly prime the viewer’s expectation of the product’s function. There is a need to investigate this relationship further. Specifically, it is important to establish the extent to which the observed recognition errors were driven by controlled and deliberate cognitive processes, or by automatic and spontaneous inferences. In sum, can the priming effect of these images be in some way undermined?

One factor that has received much examination, in the memory distortion literature, is the introduction of a warning. It has been proposed that explicitly

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2 Study 5 is included within the following publication:
warning participants that they have received, or are going to receive, (mis)information will make them more resistant to the type of recognition errors seen in Study 4. There will now follow a concise review of the foremost research in this area.

6.3 Warnings and Persuasion

Recently, there has been an increased call for improved communication between the memory distortion and persuasion literatures in an effort to further inform our understanding of memory distortion (Leding, 2012, Nash, Wheeler, & Hope, 2015). As Greene, Flynn, and Loftus pointed out as early as 1982, similarities exist between attitudinal and memory change paradigms. Greene et al. (1982) stated that, “In the belief arena, a belief exists, a persuasive communication follows, and belief change results. In the memory arena, a memory exists, misleading information follows, and a memory change results” (p.208). Following this intimation that variables which affect the process of belief change may also pertain to memory change, it seems wise to turn to the persuasion literature to further our understanding of explicit warnings and their effect on the suggestibility of memory.

One area of the persuasion literature that may be of particular interest is the influence of ‘forewarning’ on subsequent belief. That is, warning participants as to the possibility of receiving misinformation before it is presented. McGurie and Papageorgis (1962) suggested that forewarning an audience provided them with an opportunity to prepare a counterargument to an upcoming message or communication that may be inconsistent with their own position. A further two experiments investigating the psychological process responsible for the resistance to persuasion conducted by Petty and Cacioppo (1977) suggested that warning a person motivates them to consider more fully their own position, generating cognitive defences for the impending attack. It seems reasonable then to adopt a ‘counterargument hypothesis’ which suggests that it is not the forewarning per se that produces the resistance to persuasion, but the fact that people are motivated by the warning to consider their own position more fully. The majority of research in this area has proposed that the warning must precede any message to reduce resultant suggestibility. However, Gruder et al. (1978) found that when a discounting cue
(warning) was presented following the presentation of information that the persuasive impact of the original information was reduced.

### 6.4 Warnings and Memory

The finding that misinformation influences the accuracy of people’s memory for events (e.g., Loftus, Miller, & Burns, 1978) has motivated memory researchers to search for possible factors that may reduce or eliminate such an effect. One factor that has received much attention is the use of an explicit warning. However, to date findings have been mixed as to the effectiveness of explicit warnings in reducing such memory errors. In addition, there is some evidence to suggest that the position of the warning - either before or after the presentation of (mis)information - may alter its effectiveness. In a study by Greene et al. (1982), participants received a warning that some of the information ‘may be inaccurate’, either before (pre-event) or after (post-event) the misinformation. They found that only the pre-event warning was effective at significantly reducing suggestibility. In a similar experiment, Christiaansen and Ochalek (1983) found that participants given a warning before reading a narrative were able to edit out errant details from the narrative. In a more recent example, Chambers and Zaragoza (2001) establish that pre-event warnings, delivered prior to misinformation reduced suggestibility errors on a source ID test to the same extent as post-event warnings delivered after the presentation of misinformation – that is, the position of the warning relative to the misinformation did not significantly alter its effectiveness. Furthermore, post-event warnings were found to be clearly effective against the influence of misinformation in an experiment by Echterhoff, Hirst, and Hussy (2005), who hypothesised that post-event warnings can be an effective way to motivate people to devote more effort to source monitoring. However, Lindsay (1990) cautioned that post-event warnings are only effective if the original information and misinformation shared many of the same characteristics. Whereas Szpitalak and Polczyk (2010) found, post-event warnings to be most effective amongst participants, in this case university students, who had a personal involvement with the subject matter - reform of the university exam system. A further experiment by Nash, Wade, and Lindsay (2009) found post-event warnings to be ineffective at reducing the occurrence of false memories amongst participants who had been exposed to fabricated evidence of their own
actions. In a study designed to investigate the effectiveness of post-event warnings over time, Frost, Ingraham and Wilson (2002) found that, despite issuing participants with a post-event warning, that participants were more inclined to misattribute misinformation to the original event rather than the post-event narrative after a one-week delay.

While it is thought provoking to compare the findings of these studies, any conclusions drawn from this comparison need to be taken with caution. Researchers have, for instance, used a variety of methods to present the post-event misinformation and measured resulting memory distortions using a wide assortment of tests. Most importantly the explicitness of the warnings received by the participants have varied; in some studies warnings were vague and imprecise whereas in others precise instructions alerted participants to inconsistencies between the original and the post-event (mis)information.

6.5 Aims

The results of the previous studies – in particular Study 4 - indicate that the presence of function images on the packaging of fictitious dietary supplements can prime participants’ expectations as to the health function of those products. However, it leaves unanswered the question of whether the observed recognition errors were the result of a controlled and deliberate cognitive process, or automatic and spontaneous inferences. Thus the aim of Study 5 is twofold. Firstly, this study aims to test the replicability of the findings of Study 4. The second aim was to examine the extent to which forewarning participants would assist them in avoiding these recognition errors. Although the results of previous research in this area have been mixed, establishing the effect of a warning on participant’s suggestibility for this type of visual information has both theoretical relevance and practical applications. It is necessary to confirm whether people are spontaneously using the images on the products’ packaging to infer the product’s function. If this were the case, I would expect the addition of a warning to have little, if any, effect on the resulting number of recognition errors. However, if people were purposefully considering these images and making a more intentional judgement as to the products’ function, I would expect to see a reduction in the number of recognition errors as a result of the warning.
METHOD

6.6 Participants

An *a priori* power analysis was used to determine the number of participants necessary to detect a medium-effect size (Cohen’s $f = .25$, given $\alpha = .05$, power $= .80$, and correlation between repeated measures of $r = .20$, approximated from the Study 4 data). Based on this analysis Fifty-four University of Surrey students (44 females and 10 males, mean age $= 20.15$, $SD = 2.88$, range $= 18-34$) participated in this study. Eligible undergraduate students received remuneration in the form of a lab token for their participation. The addition of the warning condition meant it was necessary for this experiment to use a between-subjects factorial design. Participants were randomly allocated to either the warning or the no-warning group.

6.7 Design and Procedure

The procedure for this study was identical to that of Study 4, except for a single modification. Specifically, half of participants – those in the warning condition – received an explicit warning prior to the encoding phase. This warning was provided in the on-screen instructions (see Appendix O), however, to ensure that the participants had taken note of this warning the experimenter also read it aloud. The wording of the warning was as follows:

*Some of the labels you will see have pictures or symbols on them. These pictures and symbols have been placed onto the labels entirely at random. Because of this randomness, the pictures and symbols you will see actually provide no information about the product’s real function.*

For those participants in the no-warning condition, the study was identical to Study 4. Again, no participants reported at the end of the study that they recognised any of the function images as deriving from genuine products. The experimental procedure can be seen in Figure 20.
6.8 Materials

This study used the same materials as Study 4.

6.9 Ethics

This study received a favourable opinion from the University of Surrey Ethics committee, a copy of which can be found in Appendix P.
Figure 20. Diagram of the overall procedure used in Study 5.
RESULTS

6.10 Data Analysis

Participants’ responses were collected using the Psychology Software programme E-Prime™. These responses were then analysed using SPSS version 21 (IBM Corp., 2012).

Data were analysed in the following ways.

6.10.1 No-warning condition

(i) The proportion of falsely recognised critical claims was calculated for each participant in the no-warning condition. Differences in recognition of critical claims was assessed using a paired sample $t$-test;

(ii) Differences in participants’ subjective judgements (Remember, Know, Guess) for critical claims were assessed using a series of paired sample $t$-tests;

(iii) Differences in participants’ recognition of non-critical claims was assessed using a within-subjects analysis of variance (ANOVA);

(iv) Differences in participants’ subjective judgements for non-critical claims were assessed using a series of paired sample $t$-tests;

(v) Differences in participants’ true – or correct – recognition of health claims was assessed using a within-subjects ANOVA.

6.10.2 Warning condition

(vi) The proportion of falsely recognised critical claims was calculated for each participant in the warning condition. Differences in recognition of critical claims was assessed using a paired sample $t$-test;

(vii) Differences in participants’ subjective judgements for critical claims were assessed using a series of paired sample $t$-tests;

(viii) Differences in participants’ recognition of non-critical claims was assessed using a within-subjects ANOVA;

(ix) Differences in participants’ subjective judgements for non-critical claims were assessed using a series of paired sample $t$-test;
6.10.3 Comparison of warning and no-warning conditions.

(x) Differences in recognition of critical claims between the warning and no-warning conditions were assessed using a mixed-factor ANOVA;

(xi) Differences in participants’ subjective judgements for critical claims between the two conditions were assessed using a series of mixed-factor ANOVAs;

(xii) Differences in recognition of non-critical claims between the two conditions were assessed using a mixed factor ANOVA;

(xiii) Differences in participants’ subjective judgements for non-critical claims between the two conditions were assessed using a series of mixed-factor ANOVAs;

(xiv) Differences in participants’ true recognition of health claims between the two conditions were assessed using a mixed-factor ANOVA.

6.11 No-Warning Condition

6.11.1 Recognition of critical claims. The aim of this condition was to test the reliability of the findings from Study 4 by replicating its experimental procedure. For the critical measure, the findings of Study 4 indicated that participants made more recognition errors when the function images were present on the packaging and those images were congruent with the novel health claims, than when the image was absent. As with Study 4, the proportion of critical claims falsely recognised was calculated for each participant, these can be seen in the first row of Table 3 and are displayed in Figure 21. A paired sample t-test was performed and confirmed the findings of the previous study, $t(26) = 3.54$, $p = .002$, $d = 0.71$. Specifically, participants made recognition errors for critical claims more readily when the function images were present on the product packaging ($M_{present} = .28$, $SD = .27$) than when they were absent ($M_{absent} = .12$, $SD = .17$).
6.11.2 Subjective judgements for critical claims. As in Study 4, participants who indicated that they had previously seen a packaging and claim pairing were asked to make a subjective (Remember, Know, Guess) rating, indicating their metacognitive appraisal of this recognition. Again, as with the previous study, I calculated the number of ‘remember, know and guess’ responses given by each participant in both the image-present and image-absent conditions. These calculations can be seen in the top row of Table 3. Examination of the ‘remember’ and ‘know’ responses, suggests that the presence of function images increased the proportion of ‘know’ responses ($M_{\text{present}} = .11, SD = .17, M_{\text{absent}} = .04, SD = .09$; $t[26] = -2.02, p = .05, d = -0.41$), but did not significantly increase the proportion of ‘remember’ responses ($M_{\text{present}} = .04, SD = .07, M_{\text{absent}} = .02, SD = .05$; $t[26] = -1.44, p = .16, d = -0.28$). In addition, examination of the ‘guess’ responses also indicates that the presence of function images significantly increased the proportion of ‘guess’ responses ($M_{\text{present}} = .12, SD = .15, M_{\text{absent}} = .06, SD = 11$, $t[26] = -3.051, p = .005, d = -0.643$). That is to say, participants were utilising the function images on the packaging to draw inferences as to the product’s health function.
6.11.3 Recognition of non-critical claims. An analysis of participants’ responses for the novel non-critical claims was performed using a 2(Function Image: Absent vs. Present) x 2(Health Claim: Related vs. Unrelated) within-subject analysis of variance (ANOVA). This analysis confirmed the overall finding of the previous study. Specifically, this analysis revealed a non-significant main effect of function image, \((F[1,26] = 0.37, p = .55, \eta_p^2 = .01)\), and therefore confirms that participants were no more likely to make recognition errors for non-critical claims when a function image was present on the packaging than when it was absent. As with the previous study, there was also a significant main effect of health claim type, \((F[1,26] = 65.43, p < .01, \eta_p^2 = .72)\), with participants significantly more likely to falsely recognise related claims than unrelated claims. The interaction effect between the two factors was found to be non-significant, \((F[1,26] = 1.58, p = .22, \eta_p^2 = .06)\). In sum, this analysis confirms the reliability of the findings from Study 4 by suggesting that more recognition errors were made for related health claims than for unrelated health claims, regardless of whether function images were present on the packaging.

6.11.4 Subjective judgements for non-critical claims. Participants’ ‘remember, know, guess’ data was examined using three 2(Function Image: Absent vs. Present) x 2(Health Claim Type: Related vs. Unrelated) within-subjects ANOVA. The main effect of image confirmed that these data replicated the findings of Study 4, in that the presence of a function image did not significantly increase either participants ‘remember’ responses, \((F[1,26] = 0.02, p = .89, \eta_p^2 = .00)\), or participants ‘know’ responses, \((F[1,26] = 0.33, p = .57, \eta_p^2 = .012)\). There was however a significant main effect of health claim type, again replicating the data from the previous study, \((\text{Remember, } F[1,26] = 24.58, p < .01, \eta_p^2 = .486, \text{Know, } F[1,26] = 19.69, p < .01, \eta_p^2 = .431)\). The interaction between the two factors was also non-significant for both ‘remember’ and ‘know’ \((\text{Remember, } F[1,26] = 0.02, p = .89, \eta_p^2 = .00, \text{Know, } F[1,26] = 0.14, p = .71, \eta_p^2 = .00)\). Analysis of participants’ ‘guess’ ratings suggest that recognition errors made for non-critical claims were not driven by guessing. Specifically, the analysis revealed no significant main effect of function image, \((F[1,26] = 2.40, p = .13, \eta_p^2 = .09)\) nor of health claim type, \((F[1,26] = \ldots)\).
= 2.17, \( p = .15, \eta^2_p = .08 \). The interaction between the two factors was also non-significant, \((F[1,26] = 2.92, p = .10, \eta^2_p = .10)\).

### Table 3. Proportion of recognition errors for critical claims, overall and split by subjective Remember, Know, Guess response (standard deviations in parentheses).

<table>
<thead>
<tr>
<th>Condition</th>
<th>Image-absent</th>
<th>Image-present</th>
</tr>
</thead>
<tbody>
<tr>
<td>No-warning</td>
<td>Overall false recognition</td>
<td>.12 (.17)</td>
</tr>
<tr>
<td></td>
<td>Remember</td>
<td>.02 (.05)</td>
</tr>
<tr>
<td></td>
<td>Know</td>
<td>.04 (.09)</td>
</tr>
<tr>
<td></td>
<td>Guess</td>
<td>.06 (.11)</td>
</tr>
<tr>
<td>Warning</td>
<td>Overall false recognition</td>
<td>.19 (.22)</td>
</tr>
<tr>
<td></td>
<td>Remember</td>
<td>.02 (.07)</td>
</tr>
<tr>
<td></td>
<td>Know</td>
<td>.03 (.14)</td>
</tr>
<tr>
<td></td>
<td>Guess</td>
<td>.14 (.19)</td>
</tr>
<tr>
<td>Total</td>
<td>Overall false recognition</td>
<td>.15 (.20)</td>
</tr>
<tr>
<td></td>
<td>Remember</td>
<td>.02 (.06)</td>
</tr>
<tr>
<td></td>
<td>Know</td>
<td>.04 (.08)</td>
</tr>
<tr>
<td></td>
<td>Guess</td>
<td>.10 (.16)</td>
</tr>
</tbody>
</table>

6.11.5 **True Recognition.** The extent to which function images influenced participants’ correct or ‘true recognition’ of health claims - that is, the extent to which participants correctly recognised packaging and claim pairings seen during the encoding phase - was examined using a 2(Function Image: Absent vs. Present) x 2(Health Claim Type: Related vs. Unrelated) within-subjects ANOVA. The outcome of this analysis once again confirmed the findings of Study 4 in so much as it revealed no significant main effect of function image, \((F[1,26] = .05, p = .82, \eta^2_p = .00)\). That is to say, the presence of a function image did not significantly influence participants’ recognition of previously seen package and claim pairings. Furthermore, it suggests a significant main effect of health claim type, \((F[1,26] = 6.71, p = .02, \eta^2_p = .21)\) as was found in Study 4. A significant interaction between the two factors was also found, \((F[1,26] = 5.13, p = .03, \eta^2_p = .17)\). Post-hoc paired sample \(t\)-tests suggest recognition accuracy was greater for related than unrelated claims when function images were present on the packaging, \((M_{related} = .20, SD = .21, M_{unrelated} = .38, SD = .22; t(25) = 3.31, p = .003, d = 0.64)\).
6.12 Warning Condition

6.12.1 Recognition of critical claims. One of the aims of this study was to investigate whether forewarning participants would assist them in avoiding recognition errors. As with the no-warning condition, the proportion of critical claims falsely recognised by participants was calculated for this condition and can be seen in Table 3. A paired sample t-test was performed and the results indicate that there was no significant difference in the occurrence of recognition errors when the function image was present on the product packaging and when it was absent, ($M_{\text{present}} = .24, SD = .24, M_{\text{absent}} = .18, SD = .21; t[26] = .975, p = .338, d = .238$). This suggests that forewarning did assist participants in avoiding recognition errors.

6.12.2 Subjective judgements for critical claims. Examination of participants’ ‘remember, know and guess’ responses suggests that; the presence of function image increased the proportion of ‘know’ responses ($M_{\text{present}} = .03, SD = .14, M_{\text{absent}} = .10, SD = .17; t[26] = -2.13, p = .043, d = -.595$), but did not significantly increase the proportion of ‘remember’ responses ($M_{\text{present}} = .04, SD = .08, M_{\text{absent}} = .02, SD = .07; t[26] = -0.81, p = .416, d = -.239$), nor did it significantly increase the proportion of ‘guess’ responses ($M_{\text{present}} = .10, SD = .19, M_{\text{absent}} = .14, SD = .19; t[26] = 1.10, p = .282, d = 0.196$). This suggests guessing did not drive the effect, but rather participants were confident of their responses.

6.13 Comparison of Warning and No-Warning Conditions

6.13.1 Recognition of critical claims. Next, to examine the extent to which forewarnings influenced participants’ suggestibility to (mis)information, and thus reduce the occurrence of recognition errors for the critical claims, a 2(Function Image: Absent vs. Present) x 2(Condition: Warning vs. No-warning) mixed-factor ANOVA was calculated. Firstly, the results of this ANOVA confirmed the findings of the no-warning condition and Study 4. Specifically, they suggest that participants falsely recognised a greater proportion of critical claims in the function image-present condition more frequently than in the function image-absent condition, ($F[1,52] = 8.87, p < .01, \eta^2_p = .15$). Of central importance to this study, was whether the addition of a warning enabled participants to avoid making recognition errors. These analyses suggested not – the main effect of warning was not significant,
(F[1,52] = 0.09, p = .77, \( \eta_p^2 < .01 \)) and nor was the interaction effect, (F[1,52] = 2.12, p = .15, \( \eta_p^2 = .04 \)).

6.13.2 Subjective judgments for critical claims. New mixed-factor ANOVAs were conducted separately for each response type – ‘remember, know, guess’. First, the main effects of image in these analyses confirmed that these data replicated the findings of both the no-warning condition and Study 4. That is, function images significantly increased ‘know’ responses (F[1,52] = 8.61, p < .01, \( \eta_p^2 = .14 \)), but the concomitant increases in guessing and remembering were not significant (Guess, F[1,52] = 0.59, p = .45, \( \eta_p^2 = .01 \), Remember, F[1,52] = 2.35, p = .13, \( \eta_p^2 = .04 \)). These results were mirrored in a parallel series of nonparametric Wilcoxon tests, which reached identical conclusions. The interaction effects—which index the effect of warnings on each type of subjective judgment—were more revealing. These analyses suggest that the warning had almost no effect on participants’ ‘remember’ or ‘know’ responses for critical claims (Remember, F[1,52] = 0.05, p = .83, \( \eta_p^2 < .01 \), Know, F[1,52] = 0.02, p = .90, \( \eta_p^2 < .001 \)). However, the warning did significantly moderate the effect of function image on ‘guess’ responses, (F[1,52] = 6.76, p = .01, \( \eta_p^2 = .12 \)). In sum, the small and non-significant drop in recognition errors as a result of the warning appears, if anything, to reflect strategic shifts in guessing rather than a reduction in confident errors.

6.13.3 Recognition of non-critical claims. To examine the influence of forewarning participants on recognition errors for non-critical claims a 2(Function Image: Absent vs. Present) x 2(Health Claim Type: Related vs. Unrelated) x 2(Condition: No-Warning vs. Warning) mixed-factor ANOVA was calculated. The results of this analysis suggest that the presence of function images do not significantly influence recognition errors made for non-critical claims, (F[1,52] = .98, p = .33, \( \eta_p^2 = .02 \)). The analysis did however reveal a significant main effect of claim, (F[1,52] = 178.32, p < .01, \( \eta_p^2 = .77 \)) which is in line with my previous findings and suggests that significantly more recognition errors were made for related than unrelated claims. No significant interaction effect was found, (F[1,52] = .97, p = .33, \( \eta_p^2 = .02 \)).

6.13.4 Subjective judgement for non-critical claims. Three 2(Function Image: Absent vs. Present) x 2(Health Claim Type: Related vs. Unrelated) x
2(Condition: No-Warning vs. Warning) mixed-factor ANOVA were calculated separately for participants ‘remember, know and guess’ responses. Once again, no significant main effect was found for image, (Remember, $F[1,52] = 1.15, p = .29, \eta^2_p = .02$, Know, $F[1,52] = .01, p = .92, \eta^2_p = .00$, Guess, $F[1,52] = 0.06, p = .81, \eta^2_p = .00$). The analysis did however reveal a significant main effect of health claim type, which again mirrors the findings from the no-warning condition and Study 4, (Remember, $F[1,52] = 49.51, p < .01, \eta^2_p = .49$, Know, $F[1,52] = 54.98, p < .01, \eta^2_p = .51$, Guess, $F[1,52] = 5.54, p = .02, \eta^2_p = .10$). The interaction effects suggest that warning has no effect on participants’ subjective judgments for non-critical claims, (Remember, $F[1,52] = .44, p = .51, \eta^2_p = .01$, Know, $F[1,52] = 1.50, p = .23, \eta^2_p = .03$, Guess, $F[1,52] = 3.02, p = .09, \eta^2_p = .06$).

6.13.5 True Recognition. The extent to which a forewarning can influence participants’ true recognition of health claims was assessed using a 2(Function Image: Absent vs. Present) x 2(Health Claim Type: Related vs. Unrelated) x 2(Condition: No-Warning vs. Warning) mixed-factor ANOVA. The outcome of this analysis revealed no significant main effect of function image, ($F[1,52] = .01, p = .94, \eta^2_p = .00$). Although as found previously, the main effect of health claim type was significant, ($F[1,52] = 25.79, p < .01, \eta^2_p = .33$) suggesting that recognition accuracy was greater for related compared to unrelated health claims. The analysis did however reveal a significant interaction effect, ($F[1,52] = 15.59, p < .01, \eta^2_p = .23$) suggesting that the addition of a forewarning did significantly effect participants’ recognition of previously seen claims.
DISCUSSION

One of the primary aims of this study was to test the robustness of the findings from Study 4. That is, function images on product packaging can, in some cases, prime consumers’ expectations as to the health properties of those products. Data from the no-warning condition of this study replicated these original findings, confirming that participants’ falsely recognised health claims that they had not truly read and that these recognition errors increased significantly when function images were present on the products’ packaging. Furthermore, the findings from this no-warning condition support the original notion from Study 4 that participants were not purely guessing; rather they claimed to actually remember seeing the novel health claims.

This study further aimed to address the issue of whether the observed recognition errors were the result of a controlled and deliberative cognitive process or automatic and spontaneous inferences. The Remember, Know, Guess data from Study 4 had suggested that these inferences were largely implicit, insofar as the effect was not driven solely by guessing. This study addressed this assumption more directly through the use of an explicit warning. The addition of a forewarning to the memory-based experimental paradigm indicated to participants the possibility that the function images on the product packaging were inaccurate and therefore could not be used to determine health function. Previous research would lead me to expect that the addition of a ‘forewarning’ would reduce or eliminate recognition errors, as it would afford participants the opportunity to consider their own position and to prepare a counterargument to the upcoming information (McCurie & Papageorgis, 1962, Petty & Cacioppo, 1977) and so reduce people’s suggestibility to the information (Greene et al., 1982, Christiannsen & Ochalek, 1983, Chambers & Zaragoza, 2001). However, the data from this study suggest this not to be the case as no such significant reduction in recognition errors were found. This therefore suggests that participants were spontaneously using the images on the products’ packaging to infer the products’ function rather than utilising them as part of a conscious decision-making process. This finding supports the notion from Study 4 that suggests that inferences derived from function images are largely implicit, and most likely the result of a heuristic decision-making process. That is, participants
were focusing on a subset of available information – in this case the function images – that allowed them to use simple inferential rules and schemas to formulate judgements and decisions about the health claims. It is argued that decisions made via a heuristic processing system are likely to be less stable and less resistant to counterarguments, such as those that can be foreseen when a warning is given (Chaiken, 1980); however, this was not evident in the data.

It is clear from this data that images affect people’s inferences about health, and that, of particular importance, these inferences occur without direct prompting. That is, the inferences from the images were often implicit, occurring spontaneously and outside of the participants’ conscious control, rather than through deliberate reasoning. Both Studies 4 and 5 have shown that recognition errors were not due solely to educated guesswork, rather participants were confident that they read these claims, most frequently making errors with ‘know’ rather than ‘guess’ responses. Furthermore, in the current study recognition errors were not prevented when participants were explicitly warned that the images were meaningless. Together, the findings from these two studies suggest that participants were not always aware of, nor able to avoid, forming inferences when viewing the products.

The spontaneity and persistence of participants’ recognition errors implies that function imagery - such as a heart-shape - could have subtle yet pervasive effects on consumers’ cognition. This in turn has important implications for manufacturers, regulators and consumers in quantifying the extent to which specific packages and advertisements lead or mislead consumers. Such quantifications are of particular importance when considering the minimal effects of forewarnings on participants as this indicates a consumer education-based intervention may not be sufficient to offer immunity to the misleading and suggestive power of images. These implications are discussed further in Chapter 9.

6.14 Methodological Limitations

Thus far the information displayed on the product’s packaging has been restricted to function images. That is, the health claims viewed by the participants have appeared underneath the packaging rather than on the packaging itself. This was to assist with the isolation of the independent variable – function image – and to aid in determining the role of packaging imagery in people’s understanding of health
claims. However, in reality, a product’s packaging would display multiple elements, with both visual and verbal elements sharing the same product environment. Thus further study is needed to investigate the relationship between visual health claims - such as function images – and text-based health claims in a packaging environment. Study 6 therefore aims to investigate this issue and examine the combined influence of visual and text-based health claims on people’s recognition of novel written health claims.

6.15 Conclusions

This data - gained through the use of a novel indirect memory-based paradigm - indicates that function images on product packaging can lead people to infer health claims, and that these inferences can occur at least partly outside of a person’s conscious control. That is to say, this data has shown that recognition errors are not solely the result of guesswork, but rather participants were confident that they had read these health claims. Of particular importance, is the finding that recognition errors were not prevented when participants were explicitly warned that the images were meaningless; suggesting that participants were not necessarily aware of, nor actively able to avoid, forming health inferences from function images. However, this study is not without its limitations. Further research is needed to better understand how visual and text-based information, present on a product’s packaging, interact to influence consumers’ understanding of a product’s health function.
CHAPTER SEVEN


7.1 Chapter Overview

Data from the studies thus far presented in this thesis have strongly indicated that function images on product packaging can lead people to infer health benefits about that product. Furthermore, data gained through a novel indirect memory-based measure suggests that these inferences may not be the result of deliberate decision-making, but rather occur outside of a person’s conscious control. However, these studies were limited insofar as they only focused on the manipulation of function image. The present study therefore aims to investigate the relationship between visual and text-based health claims, displayed on a product’s packaging, and their influence on people’s recognition of written health claims.

7.2 Introduction

The findings from my previous studies indicate that function images, can in some cases, ‘prime’ people’s expectations as to a product’s health function, which in turn, increases their confidence that they have previously seen novel written health claims referring to the health function portrayed by the image. Indeed, in some instances people actually claim to ‘remember’ reading these previously unseen claims. Furthermore, the novel indirect memory-based measure used in studies 4 and 5, indicates that people do not use such images as part of a deliberate decision-making process, but rather as an implicit process in which they utilise more heuristic decision-making so as to derive impressions from one source – packaging imagery - to form expectations about another – the product’s health function. This notion concord with other previous research, such as that by Becker et al. (2011), who suggest that aspects of the product’s packaging design - such as its shape, colour, typography and imagery - can act to alter people’s expectations about aspects of the product, for example, its taste.

Thus far the studies presented have examined function images on product packaging in isolation from any text-based packaging claims. Moreover, the data
presented thus far also provides strong support for the notion that images can act as health claims. However, the ambiguous natures of images and the current lack of research on how they might influence consumer understanding means that images rarely – if ever – appear as standalone health claims on a product’s packaging. It is therefore essential to more fully comprehend how these images interact with written text-based health claims present on product packaging, and specifically how these elements interact to influence memory for novel health claims.

7.3 The Picture – Superiority Effect

One explanation as to how images and text may interact is the picture–superiority effect, or the suggestion that pictures are remembered better than words. This concept is not something new; indeed it was as early as 1894 that this phenomenon was first documented by Kirkpatrick in a study in which he presented participants with either words or pictures and tested retention for these items both immediately and 72 hours later (Roediger & Karpicke, 2006). It wasn’t, however, until the 1960s that researchers arrived at the conclusion that – when presented with a list of pictures and words, pictures are better remembered in both free recall (e.g., Paivio, Rogers, & Smythe, 1968), and recognition tasks (e.g., Madgian, 1983). There are several explanations as to the mechanisms underlying the picture-superiority effect. One of the first explanations was the dual-coding theory by Paivio (1971, 1976) that suggests that pictures are encoded in both verbal and visual representation and so there is an increased probability of later retrieval. Another explanation suggests that it is the distinctiveness of images that improves their retrieval from memory. Nelson (1979) suggested that words and pictures share the same semantic codes, but images are more likely to be encoded uniquely in memory since they have more distinctive visual features. A further explanation purports that pictures receive more extensive semantic processing than words, and thus benefit from deeper levels of processing (see Craik & Lockhart, 1972). These explanations all share the same fundamental assumption, that is, pictures are in some way more elaborate, distinctive, or meaningful in their memory representation than words (Hockley, 2008). Although the picture superiority effect on memory is an established and highly supported theory, it is not an exclusive finding as there is evidence to suggest that under certain conditions, verbal or text-based information is
learned as readily as images (Childers & Houston, 1984). Specifically, text-based information appears to be more readily learnt when a person is both capable of processing its semantic content and is motivated to do so. Whereas information in the form of visual images is utilised more readily when a person is unable to process semantically or is not motivated to do so (Childers & Houston, 1984).

7.4 Picture – Text Congruence

Marketers seeking to communicate a coherent message to consumers have long been aware of the importance of congruence amongst packaging elements. This is supported by theories relating to processing fluency which suggest that congruency among pictorial and text-based elements on packaging increase processing fluency which inspires positive affect which in turn can result in a favourable evaluation of the product (e.g., Lee & Labroo, 2004, Reber et al., 2004; Van Rompay et al., 2010). In addition memory for written benefit claims in advertisements were also found to be enhanced when the meaning of the claim was congruent with the image (Childers & Jass, 2002). However, to date, there is little research on how health specific images and text on product packaging interact to affect our understanding of the product’s health function.

7.5 Health Images and Health Claims

One area of literature that it would be useful to draw upon is that of health education. This research suggests that images attract people’s initial attention that, in turn, stimulates them to attend to additional, often text-based, information (Houts et al., 2006). For example, a study by Delp and Jones (1996) found that patients given an information leaflet with both text and images were significantly more likely to attend to its informational content, and remember that information at a later date, compared with those patients who had a text only leaflet. This would seem to suggest that the addition of an image to a product carrying a text-based health claim would act to increase the consumer’s attention for that claim.

Further research suggests that people sometimes experience difficulty in understanding healthcare information. Studies have shown that healthcare information is often unfamiliar to people and contains complex concepts and words (Ley, 1982). This may also be said of health claims present on food and dietary
supplement packaging, even though EC legislation maintain that such claims need to be both scientifically substantiated and understandable to the ‘average consumer’ (EC, 2006). Indeed, it is these very requirements that may present a problem for marketers wishing to communicate clearly with their consumers. For example, health claims may need to include names of nutrients or medical terms that may be unfamiliar to the average consumer (e.g., “Beta-Glucans contribute to the maintenance of normal blood cholesterol levels”). In this instance the addition of an image (e.g., a heart) may assist the consumer by improving understanding of the text-based claim.

### 7.6 Aims

This study aims to replicate the methodology of Studies 4 and 5, by using a memory-based measure to investigate whether the presence of both function images and written health claims on the packaging of fictitious dietary supplement products affect the production of recognition errors for novel written health claims by the viewer. Specifically, it aimed to investigate whether the congruence of function images and text-based health claims present on a product’s packaging would increase the production of recognition errors for novel written health claims made by the viewer, compared to when the product packaging displays a function image and text-based claim that are incongruent, or when the product packaging does not carry a function image. In short, recognition errors are predicted to increase when both the function image and the text-based health claim refer to the same health function, for example heart health.
7.7 Participants

Forty-six University of Surrey students (45 females, 4 males, mean age = 19.78 years, SD = 3.75, range =18-37) participated in this study. Eligible undergraduate students received remuneration in the form of lab tokens for their participation. Students who had taken part in Study 1, Study 4 or Study 5 were excluded from participation.

7.8 Design

This study took the form of a single-session computer-based laboratory experiment of approximately 40 minutes duration. The independent variables were [1] the presence or absence of a function image on the fictitious dietary supplement packaging, and [2] whether the written health claim displayed on the product packaging – hereafter known as the ‘packaging claim’ - was congruent or incongruent with the health function suggested by the function image. The experiment therefore followed a 2(Function Image: Present vs. Absent) x 2(Packaging Claim: Congruent vs. Incongruent) x 3(Written Health Claim: Related vs. Unrelated vs. Critical) design. The dependent variable was the proportion of critical claims that participants indicated that they recognized. A measure of participants’ metacognitive appraisal, in the form of a Remember, Know, Guess judgement was also taken.

7.9 Materials

7.9.1 Dietary Supplement Packaging. The six fictitious dietary supplement packaging designs used in Studies 1, 4 and 5 were again used in this study. In addition to these existing designs, two new packaging designs were created following the same procedure that is outlined in section 2.5.1 - the method section - of Study 1. These additional packages related to the health categories of ‘weight management’ and ‘digestive function’, thus a total of 8 health categories were represented by the packages used in this study (women’s health, memory and cognitive function, sleep, bones and joints, colds and flu, heart function, weight
management, digestive function). The packaging designs were further modified with the addition of packaging claims to each design. These packaging claims were either congruent with the health function as depicted by the function image (e.g., both the packaging claim and the function image relates to heart health), or incongruent with the health function as depicted by the function image (e.g., the packaging claim relates to women’s health, and the function image depicts colds and flu). As was the case for the claims used in the previous studies, all claims were based upon those found on the packaging of genuine dietary supplements available for sale in the UK; where necessary these claims were adapted to ensure approximate consistency in terms of the number of words per claim. Four versions of each packaging design were created for each health category. Figure 22 illustrates the use of packaging claims on the function image-present and function image-absent product packages. The packaging depicted in Figure 22 represents the health category ‘digestive function’, thus the congruent packaging claim relates to digestive function; “Supports digestive regularity”, whereas the incongruent packaging claim relates to an alternative health category, in this instance bones and joints.

7.9.2 Written health claims. For the six original packages designs (women’s health, memory and cognitive function, sleep, bones and joints, colds and flu, heart function) the sets of 14 written health claims created for use in Study 4, were again used in this study. For the two new packaging designs, additional sets of 14 written health claims were created using the same procedure outlined in the method section of Study 4. A list of the critical health claims used in this study can be found in Appendix T.

7.10 Procedure

The procedure for this study was identical to that of Study 4 (See Figure 23).

7.11 Ethics

This study received a favourable opinion from the University of Surrey Ethics Committee. A letter confirming this can be found in Appendix U.
Figure 22. Products’ representing the health category of ‘Digestive Function’. Image (a) represents the function image-present x packaging claim congruent condition; image (b) represents the function image-present x packaging claim incongruent condition; image (c) represents the function image–absent x packaging claim congruent, and image (d) represents the function image-absent x packaging claim incongruent condition.
Figure 23. Diagram of the overall procedure used in Study 6.
RESULTS

7.12 Data Analysis

Participants’ responses were collected using the Psychology Software programme E-Prime™. These responses were then analysed using SPSS version 21 (IBM Corp., 2012).

The data were analysed in the following ways.

(i) The proportion of falsely recognised critical claims was calculated for each participant. Differences in participants’ recognition of critical claims were assessed using a within-subjects analysis of variance (ANOVA). Where appropriate, post-hoc paired sample t-tests were performed;

(ii) Differences in participants’ subjective judgements (Remember, Know, Guess) for critical claims were analysed individually, using a series of paired sample t-tests;

(iii) Differences in participants’ recognition of non-critical claims were assessed using a within-subjects ANOVA;

(iv) Differences in participants’ subjective judgements for non-critical claims were analysed individually, using a series of paired sample t-tests;

(v) Differences in participants’ true – or correct – recognition of health claims was assessed using a mixed-factor ANOVA.

7.13 Recognition of Critical Claims

This study aimed to examine whether the addition of text-based health claims (packaging claims) on the packaging of fictitious dietary supplement products would significantly influence the production of recognition errors made by participants for critical health claims. To this end, the proportion of critical claims falsely recognised was calculated for each participant. Next, a 2(Function Image: Absent vs. Present) x 2(Packaging Claim: Congruent vs. Incongruent) within-subject ANOVA was conducted. This analysis suggests that the presence of a function image did not significantly influence recognition errors made for critical health claims, \( F[1,45] = 2.62, p = .11, \eta^2_p = .06 \). This finding is contrary to those of
Studies 4 and 5, which suggest the presence of a function image on the packaging of the fictitious dietary supplement leads to an increase in recognition errors made by participants for critical health claims. Figure 24 does however show that the effect was in the same direction as those earlier studies.

The analysis did however reveal a significant main effect of packaging claim, \(F[1,45] = 13.73, p < .01, \eta_p^2 = .23\). Post-hoc t-tests indicate that recognition errors were more likely to occur when the packaging claim was congruent to the function image, than when it was incongruent to the function image (Absent: \(M_{congruent} = 0.30, SD = 0.25, M_{incongruent} = 0.16, SD = 0.28; t[45] = -3.66, p = .001, d = -0.54\). Present: \(M_{congruent} = 0.33, SD = 0.33, M_{incongruent} = 0.23, SD = 0.25; t[45] = -1.91, p = .06, d = -0.29\), this can also be seen in Figure 24. The interaction effect between function image and packaging claim was found to be non-significant, \(F[1,45] = 0.47, p = .50, \eta_p^2 = .01\) suggesting that the production of recognition errors for critical health claims is unaffected by the congruence of the function image and packaging claim displayed on the product.

![Figure 24](image_url)

*Figure 24. Proportion of cases in which participants falsely recognised packaging claims. Error bars as Standard Error.*
Table 4. Proportion of recognition errors for critical claims, split by subjective response (standard deviations in parentheses).

<table>
<thead>
<tr>
<th>Packaging Claim</th>
<th>Function Image-absent</th>
<th>Function Image-present</th>
</tr>
</thead>
<tbody>
<tr>
<td>Congruent</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Remember</td>
<td>.26 (.53)</td>
<td>.43 (.69)</td>
</tr>
<tr>
<td>Know</td>
<td>.39 (.61)</td>
<td>.43 (.69)</td>
</tr>
<tr>
<td>Guess</td>
<td>.57 (.72)</td>
<td>.57 (.75)</td>
</tr>
<tr>
<td>Incongruent</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Remember</td>
<td>.17 (.49)</td>
<td>.20 (.53)</td>
</tr>
<tr>
<td>Know</td>
<td>.17 (.48)</td>
<td>.26 (.49)</td>
</tr>
<tr>
<td>Guess</td>
<td>.17 (.53)</td>
<td>.48 (.78)</td>
</tr>
</tbody>
</table>

7.14 Subjective Judgements for Critical Claims

The number of remember, know and guess responses given by participants were calculated for each of the four conditions, [1] image-present/congruent packaging claim, [2] image-absent/congruent packaging claim, [3] image-present/incongruent packaging claim, and [4] image-absent/incongruent packaging claim, these calculations can be seen in Table 4. Paired sample t-tests were then performed on this data for each of the three types of judgement.

7.14.1 Guess. Examination of participants’ guess responses suggest that the presence or absence of the function image on the product’s packaging did not significantly influence guessing when the packaging claim was congruent, (M<sub>present</sub> = .57, SD = .75, M<sub>absent</sub> = .57, SD = .72; t[45] = .00, p = 1.00, d = 0). However, function image did significantly influence guess responses for incongruent claims with guessing increasing when a function image was present, (M<sub>present</sub> = .49, SD = .78, M<sub>absent</sub> = .17, SD = .53; t[45] = -2.54, p = .015, d = -0.39). There was no significant difference between mean guess responses in the congruent and incongruent claims conditions when the function image was present, (t[45] = .66, p = .51, d = .10) but a difference between means was found when the function image was absent, (t[45] = 2.78, p = .008, d = .41).

7.14.2 Remember. The presence of function images on the product packaging does not lead to a significant increase in participants’ assertions that they ‘remember’ previously seeing the health claims and packaging together during the encoding phase of the study. This was found to be the case whether the function image and packaging claim were congruent, (M<sub>present</sub> = .43, SD = .69, M<sub>absent</sub> = .26,
$SD = .53; t[45] = -1.60, p = .188, d = -.24$) or whether the function image and packaging claim were incongruent, ($t[45] = -.206, p = .84, d = -.16$). In addition, there was found to be no significant difference between mean ‘remember’ responses for the congruent and incongruent packaging claim conditions when the function image was absent from the product’s packaging, ($t[45] = 1.07, p = .29, d = .16$). However, when the function image was present on the product packaging and the packaging claim was congruent to the image, mean ‘remember’ responses increased in comparison to the image present – incongruent packaging claim condition, ($t[45] = 2.30, p = .026, d = .35$). This finding is comparable to the findings from Studies 4 and 5, and suggests that participants were creating false memories for the critical health claims. That is, when the packaging claim was congruent with the function image participants’ recognition errors were not being driven purely by guessing, but rather participants were confident that they ‘remembered’ seeing them.

7.14.3 Know. No significant difference was found between participants ‘know’ responses when the image and packaging claim were congruent, ($M_{\text{present}} = .43, SD = .69, M_{\text{absent}} = .39, SD = .61; t[45] = -0.34, p = .736, d = -0.06$) nor when the function image and packaging claim were incongruent, ($M_{\text{present}} = .26, SD = .49, M_{\text{absent}} = .17, SD = .49; t[45] = -1.159, p = .25, d = -0.17$). That is to say, the presence of a function image on the dietary supplement packaging did not lead to increased reports from participants of ‘knowing’ that they had seen the critical health claim and product packaging together during the encoding phase of this study. Participants were however significantly more likely to make a know response for critical claims in the image-absent/congruent packaging claim condition than in the image-absent /incongruent packaging claim condition, ($t[45] = 2.34, p = .024, d = .28$). Packaging claim type did not significantly affect ‘know’ responses when the image was present, ($t[45] = 1.35, p = .185, d = .33$).

7.15 Recognition of Non-Critical Claims

Further analysis was conducted in the form of a 2(Function Image: Absent vs. Present) x 2(Packaging Claim: Congruent vs. Incongruent) x 2(Health Claim: Related vs. Unrelated) within-subjects ANOVA to examine the extent to which images and text present on the packaging of fictitious dietary supplements can act to influence participants’ false recognition for novel non-critical health claims. The
analysis suggests that the presence of a function image did not significantly affect participants’ false recognition of non-critical health claims, \((F[1,45] = 0.32, p = .57, \eta^2_p = .01)\). This result is as expected given that the non-critical health claims did not relate to any purported product function that may have been inferred from the function images. Furthermore, the analysis revealed that the type of packaging claim - whether congruent or incongruent - had no significant affect on recognition errors made for non-critical health claims, \((F[1,45] = 2.65, p = .110, \eta^2_p = .06)\). There was however a significant main effect of health claim, \((M_{related} = .50, SE = .03, M_{unrelated} = .84, SE = .02, F(1,45) = 126.14, p < .01, \eta^2_p = .74)\) suggesting that participants made more recognition errors for novel unrelated health claims compared with novel related health claims. No significant three-way interaction was found between the factors, \((F[1,45] = .02, p = .90, \eta^2_p = .00)\).

7.16 Subjective Judgements for Non-Critical Claims

Participants’ subjective judgments for novel non-critical claims were examined using three 2(Function Image: Absent vs. Present) x 2(Packaging Claim: Congruent vs. Incongruent) x 2(Written Health Claim: Related vs. Unrelated) within-subject ANOVAs.

7.16.1 Guess. Analysis of participants’ ‘guess’ judgements suggests that recognition errors made for novel non-critical health claims were not driven by guessing. Specifically, the analysis revealed no significant main effect of function image, \((F[1,45] = 0.88, p = .35, \eta^2_p = .02)\) or of packaging claim, \((F[1,45] = 0.01, p = .94, \eta^2_p = .00)\). There was however a significant difference in participants’ reports of guessing for related and unrelated health claims, \((M_{related} = .36, SE = .05, M_{unrelated} = .30, SE = .05, F[1,45] = 16.09, p < .01, \eta^2_p = .26)\) suggesting that participants made more ‘guess’ responses when the health claim related to some aspect of the product - other than the function image or packaging claim - than when the health claim was completely unrelated to the packaging. The interaction between the three factors was non-significant, \((F[1,45] = 0.19, p = .67, \eta^2_p = .00)\).

7.16.2 Remember. The analysis of participants’ ‘remember’ responses found no significant main effect of function image, \((F[1,45] = 0.55, p = .46, \eta^2_p = .01)\) and no significant main effect of packaging, \((F[1,45] = 2.96, p = .09, \eta^2_p = .06)\).
This suggests that, in this instance, elements present on the products’ packaging did not drive participants’ ‘remember’ judgements. There was however a significant main effect of health claim type, suggesting that, in some cases, participants were more confident that they actually remembered seeing related claims in comparison to unrelated claims, \((M_{\text{related}} = .85, \ SE = .10, \ M_{\text{unrelated}} = .16, \ SE = .03, \ F[1,45] = 50.51, \ p < .01, \ \eta^2_p = .53)\). No significant three-way interaction was found between the factors, \((F[1,45] = 0.01, \ p = .93, \ \eta^2_p = .00)\).

7.16.3 Know. The analysis of participants’ ‘know’ responses revealed a similar finding to the ‘guess’ and ‘remember’ responses. Specifically, the analysis found no significant main effect of function image, \((F[1,45] = 0.77, \ p = .39, \ \eta^2_p = .02)\) of packaging, \((F[1,45] = 0.32, \ p = .57, \ \eta^2_p = .01)\). A significant main effect of health claim type was found, \((F[1,45] = 32.80, \ p < .01, \ \eta^2_p = .42)\) which again suggests that participants were more confident that they had previously seen related \((M = .70, \ SE = .07)\) rather than unrelated claims \((M = .27, \ SE = .04)\). There was no significant three-way interaction between the factors, \((F[1,45] = 0.68, \ p = .42, \ \eta^2_p = .02)\).

7.17 True recognition

The extent to which text-based health claims present on a product’s packaging can influence a participants’ true recognition for health claims was assessed using a 2(Function Image: Absent vs. Present) x 2(Packaging Claim: Congruent vs. Incongruent) x 2(Written Health Claim: Related vs. Unrelated) mixed-factor ANOVA. This analysis revealed no significant main effect of function image, \((F[1,45] = 1.15, \ p = .29, \ \eta^2_p = .03)\) suggesting that the presence or absence of a function image did not affect participants’ recognition accuracy for previously seen items. Similarly, the analysis found no significant main effect of packaging claims, \((F[1,45] = 3.90, \ p = .05, \ \eta^2_p = .08)\) that is to say, whether the packaging claim was congruent or incongruent with the function image appeared not to influence participants’ recognition accuracy. The analysis did however reveal a significant main effect of health claim, \((F[1,45] = 37.48, \ p < .01, \ \eta^2_p = .45)\) as participants’ recognition accuracy was greater for related than unrelated health claims. No three-way interaction was found between the factors, \((F[1,45] = .69, \ p = .41, \ \eta^2_p = .02)\).
DISCUSSION

The purpose of this study was to expand on the findings of Studies 4 and 5 by examining how both function images and text-based packaging claims present on the packaging of fictitious dietary supplements might influence a person’s recognition for novel health claims. The data from Studies 4 and 5 strongly indicated that the presence of a function image and a congruent text-based packaging claim would lead to an increase in recognition errors for novel health claims made by the viewer. Although the data was indicative of this prediction – it was not significantly so. Furthermore, while this finding was not driven purely by guessing, there was no suggestion in the data that it was driven by an increase in participants ‘remembering’ the novel health claims either.

One explanation for this variation in finding may be to do with the nature of the experimental task and how it influences participants’ judgements and decision-making. Previous research has suggested a picture-superiority effect in which pictures are remembered better than words (e.g., Madgian, 1983). However, it has also been suggested that when motivated, people will more readily learn text-based information (Childers & Houston, 1984). In this experiment participants were aware of the task’s nature – a memory task. They might therefore have been motivated to utilise a more systematic or elaborative process. In short, participants were motivated to learn the text-based information present on the product’s packaging. Furthermore, during the recognition phase of this experiment participants were required to indicate whether or not they had previously seen the novel health claims. Therefore cognitively it may have been more advantageous, given the nature of the task, for the participant to retrieve text-based health claims from their memory. Thus any recognition error may be attributed to source-monitoring errors resulting from the similarity between the packaging and novel health claims. However, this explanation doesn’t fully explain why the findings of this study deviated from those of Studies 4 and 5, especially given the same experimental procedure was used in all three.

A further possible explanation relates to the timing of this study within the academic year and the potential for individual differences between the student participants sampled in this study and Studies 4 and 5. All three studies made use of
the school of psychology’s participant pool formed of individuals undertaking an undergraduate programme in psychology. Although all three studies were open to students throughout the university, the vast majority of participants were derived from the participant pool. A large proportion of students from the participant pool were excluded from participation in this study as they had already participated in Studies 1, 4 and 5. This together with the fact that the study was run late in semester two, suggests that individual differences might have played a part in the outcome of this study (See Witt, Donnellan, & Orlando, 2011, for a discussion on the timing of studies and selection of participants within a participant pool).

Given that function images and text-based health claims are rarely found in isolation on product packaging, it would be prudent to investigate further how these elements might work in combination to influence consumers’ understanding of a product’s health function. This knowledge is essential for those tasked with regulating the use of health claims – both visual and verbal – on food and dietary supplement products and is all the more important given the strength of the findings from my previous studies which suggests that images can act as health claims that influence both people’s belief in, and memory for, a product’s health function and that this influence occurs outside of people’s conscious awareness.

7.18 Methodological Limitations

The research thus far presented in this thesis has restricted its investigation to the influence of packaging imagery on consumers understanding of health claims. However, current EC legislation relates to the use of both nutrition claims and health claims made on foods. It would therefore be of interest to expand the current research to investigate the influence of function images on people’s memory for different types of claims permitted for use on food product packaging. This legislation further states that the use of nutrition and health claims be understandable to the ‘average consumer’. The sample in the current study was comprised of university students, and thus the final study in this thesis will aim to expand the findings of the current research through the use of a more diverse and representative sample of ‘average consumers’. A further limitation of the memory-based paradigm used in Studies 4, 5 and 6, is that it involves only a recognition memory task. If the findings of these studies could be extended to a free recall task, this would lend
further weight to the conclusion that the consumer generates inferences spontaneously. The final study in this thesis therefore proposes to use a memory-based paradigm with both a free recall and recognition tasks.

7.19 Conclusion

In contrast to the findings from Studies 4 and 5, the data from this study did not show a significant effect of function image; although the trend was in the same overall direction as that found previously. Given the propensity for images and text to appear together on product packaging, it is perhaps prudent to study this relationship further. The final study in this thesis – Study 7 - provides an opportunity to do just that. Study 7 also aims to expand on current research through the use of a more diverse and representative sample of average consumers, and by expanding the current memory-based paradigm to include a free recall task, in addition to the current recognition task. It further provides an opportunity to study a wider range of packaging claims on a variety of food and beverage packaging.
CHAPTER EIGHT

STUDY 7: Investigating the Role of Health Related Claims and Symbols in Consumer Understanding (CLYMBOL)

8.1 Chapter Overview

The final study in this thesis aims to expand on the work of the previous studies with an online experiment conducted in five European Member States. This study aims to develop the current memory-based paradigm used in Studies 4, 5 and 6, to include a free recall task, with the aim of further examining whether inferences are the result of spontaneous and unconscious decision-making. In addition, it aims to investigate the influence of function images on people’s memory for different types of claims, permitted for use under current EC legislation. Finally, it is the intention of this study to gather data from a diverse and representative sample of European consumers.

8.2 Introduction

The overarching aim of this thesis was to examine the role of packaging imagery in people’s understanding of products’ health functions. Previous research (e.g., Carrillo et al., 2014, Saba et al., 2010) and current EC legislation assert that images can act as health claims. Study 1 confirmed this notion, with Study 2 both confirming these findings and expanding on them by suggesting that images can influence people’s perception as to the potential benefits of consuming a product. However, Study 3 cautioned that these findings cannot necessarily be generalised to other types of images or previously experienced products. These three studies used direct measures of understanding, which are not without their limitations. Thus Study 4 introduced a novel indirect memory-based measure, which confirmed the findings of the direct measures insofar as function images on product packaging can, in some cases, prime consumers’ expectations as to the potential health properties of those products. Furthermore, the addition of a warning in Study 5 did not produce the expected reduction in recognition errors and so gives cause to believe that

3 Study 7 is included within the following publication:
participants were not aware of, nor able to avoid, forming inferences when viewing the products. Finally, Study 6 examined the interaction of function images and text-based packaging claims, and although no significant effect of function image was found, the overall direction of the trend was reflective of previous findings. This final study therefore aims to expand on the work of these previous studies with three further aims. Firstly, this study aims to see whether the effect found in Studies 4 and 5 extend to a free recall task – that is, when people attempt to reconstruct the claims from memory, rather than simply making old/new judgements as in the recognition task used in the previous studies. The second aim was to compare the effect of function images on memory across different types of claim permitted for use on product packaging. The third aim sought to extend previous findings to a sample of representative European consumers. More broadly, this study also affords the opportunity to expand my investigation of the combined use of images and text-based claims on product packaging, and also to study a broader range of food and beverage ‘products’. These aims will now be discussed in more detail.

8.3 Recall and Recognition

The primary aim of this study was to see whether the effects observed in Studies 4 and 5 could be extended to a recall task. If consumers really do form these implicit or explicit inferences without prompting, then they should generate the false information themselves rather than only affirming false information that is suggested to them at test. Therefore, if the effects transpire in recall as well as recognition memory, then this would add greater weight to the conclusion that function images promote unprompted inferences about health, as well as to the external validity and robustness of the effects. Evidence suggests that consumers’ primarily utilise heuristic reasoning when making decisions about a product (Payne, 1976). That is to say, when a consumer encounters a novel piece of information about a product, such as a function image or claim present on it’s packaging, an existing schema is evoked. The novel information can then be evaluated for its consistency with the evoked schema, with schema consistent information being significantly more likely to be recalled by the consumer (Fisk & Neuberg, 1990). It might therefore be reasonable to assume that if a person were to see an image of a heart on a food product’s packaging, schemas relating to heart function and health would be evoked. Thus
through the use of heuristic reasoning a person is likely to infer that the food product displaying this image on its packaging is indeed good for their heart.

8.4 Types of Health Claims

Thus far the studies in this thesis have focused specifically on the effects of function images on memory for health claims. The current study aims to expand on this by comparing the effect of function images on memory across different types of claims permitted for use on product packaging in EC member states.

Current EC legislation distinguishes between nutrition claims – which simply make reference to ingredients or constituents of a product – and health claims, which make assertions about a specific health benefit provided through consuming that product or its constituents. Specifically, the term health claim as defined in Regulation (EC) 1924/2006 refers to “…any claim that states, suggests or implies that a relationship exists between a food category, a food or one of its constituents and health” (Art. 2.2.5). Furthermore, there are two types of health claim that can be applied under this definition; general function health claims and disease risk reduction claims. The claims used in this study were general function claims or those describing or referring to (a) the role of a nutrient or other substance in growth, development and the functions of the body; or (b) psychological and behavioural functions; or (c) slimming or weight control or reduction in the sense of hunger or an increase in the sense of satiety or to the reduction of the available energy from the diet (EC, 2006, Art. 13.1a). An example of general function health claims would be “Calcium is needed for the maintenance of normal bones”. It is predicted that when products carry health claims such as these, the presence of function images would facilitate correct recollection of these claims. However, this study is also interested in comparing this effect of function images with other claim types. Of particular interest is the effect of function images on people’s memory for nutrition claims. Nutrition claims are those that state, suggest or imply that a food has a particular beneficial nutritional property due to its energy value and/or the nutrients, or other substances, it contains (EC, 2006, Art 2.4). Some examples of nutrition claims are, “Source of Zinc” and “High Fibre”. When products carry nutrition claims, I would predict that the presence of function images would increase the likelihood that these claims would be ‘upgraded’ to health claims in memory. In other words, people
would use the function image to infer how the particular nutrient or constituent should benefit them. The final type of claim of interest to this study is ‘generic claims’. These claims do not relate to either the nutrition content or potential health benefit of the food product, rather they are advertising claims made by the manufacturer, and often relate to a product’s taste, flavour or texture. An example of a generic claim would be “great tasting.” For these claims I predict a more modest effect of image, as cognitively they are more distant from the perceived benefits of the product and thus are unlikely to be incorporated into a schema for health claims.

8.5 The Average Consumer

The final aim of this study was to extend the current findings to a more diverse and representative participants sample, or the ‘average consumer.’ This is because current legislation requires that the use of nutrition and health claims be both scientifically substantiated and understandable to the ‘average consumer’. Specifically, it states that the ”use of nutrition and health claims [sic] be permitted if the average consumer can be expected to understand the beneficial effects as expressed in the claim” (EC, 2006, Art 5.2) with the average consumer being defined as one who is “reasonably well informed and reasonably observant and circumspect, taking into account social, culture and linguistic factors” (EC, 2006, par 16). It is therefore essential to understand how function images on product packaging may act to influence peoples’ understanding of both nutrition and health claims. To this end, instead of sampling only university students, a sample of average consumers was collected from five European member countries.

8.6 Aims

(i) To examine whether the effects found in Studies 4, 5 and 6 extend to a free recall task. This will be achieved through the addition of a free recall task to the current memory-based paradigm.

(ii) To compare the effect of function images on memory across different types of claim permitted for use under current EC legislation.
(iii) To extend the findings of Studies 4, 5 and 6 to a more diverse and representative participant sample, that is, a sample of ‘average consumers’.
METHOD

8.7 Participants

A total of 410 participants were recruited using a UK-based online panel provider, and completed the study in full. However, upon initial inspection, 38 participants were removed from the sample due to technical errors that prevented them from fulfilling the requirements of the experiment. Thus the final sample comprised 372 participants (187 males and 185 females, mean age = 45.07 years, SD = 14.53, range = 18 -75 years) from five European countries (Germany = 79; Netherlands = 71, Slovenia = 71, Spain = 70, UK = 81). Within each nationality a stratified sample of males and females across a breadth of age groups (18-74 years) and terminal educational level was obtained. Those working in the food industry were excluded from participating. The participants received remuneration, given in the form of points, for their participation directly from the panel company.

8.8 Design

The study took the form of an online experiment of approximately 30 minutes duration, and used a 2(Function Image: Present vs. Absent) x 3(Claim Type: Nutrient vs. Health vs. Generic) within-subject design. The study comprised three phases: an encoding phase, a recall phase, and a recognition phase. All participants completed the study in their own language.

8.9 Materials

8.9.1 Food packaging. To begin, six health functions were chosen, together with two foodstuffs containing nutrients that could support each of those functions (e.g., foods containing fiber for bowel function/digestion, carbohydrates/electrolytes for muscles and energy, zinc for cognitive function, beta-glucans for lowering cholesterol, vitamin D for healthy teeth, and calcium for healthy bones). For each of these 12 foodstuffs brand-neutral carrier packaging was designed. This was achieved by taking generic packaging images from the Internet, and using Adobe Photoshop™ to remove much of the detail from these to create a basic product template. A fictional brand name, a description of the foodstuff (e.g., “wholegrain bread”), a picture of the foodstuff, and some other generic information (e.g., the product’s
weight) was added to each product. Next, a selection of product packaging - gathered from five target countries - was examined for functional health images. Suitable images were isolated from their original packaging environment using the photo editing software Adobe Photoshop™ and considered for possible inclusion in this study. Criteria for inclusion were as follows, [1] The product from which the image was taken must be for sale in one or more of the target countries. [2] The image has to depict a specific ‘health function’. Any images that were considered to depict nutrients (i.e., a wheat stem as representative of fibre) were rejected. [3] Images that related to a specific charity or group of charities (i.e., British heart foundations or British dental health foundation) were also discarded, and [4.] the image must be ‘standalone’. That is, it can be isolated from its original packaging content and still make sense as a ‘functional health image’. For example, to represent ‘muscles and energy’ an image of a running man was chosen. A final selection of six functional health images were chosen for use in this study and are displayed in the far right column of Table 5. For each of the 12 foodstuffs a parallel version of the packaging was created onto which the appropriate function image was digitally added (the same image was added to both foodstuffs representing each of the six health-function categories). These two versions of each package constitute the basis of the ‘image-present’ versus ‘image-absent’ manipulation.

8.9.2 Health claims on packaging. The three claim types used in this study were, nutrient claims (e.g., “Source of Zinc”), health claims (e.g., Zinc contributes to normal cognitive function”) and generic claims (e.g., “Fantastic new taste”). The nutrition and health claims were selected and worded based on the guidance and approved claims in the ‘EU Register of Nutrition and Health Claims Made on Food’ (European Commission [EC], 2013). The nutrient claims chosen were all Article 8 claims, worded to meet the conditions of use set out in the Annex of Regulation (EC) No 1924/2006. The function claims selected were all Article 13.1 health claims - that is, they were ‘health claims other than those referring to the reduction of disease risk and to children’s development and health’ (EC, 2006 par. 26). One of the two health claims for each nutrient exactly replicated the wording as it appears on the EU register (EC, 2013). The second health claim closely resembled the suggested wording of the register, but varied in a way similar to how it might appear on a product packaging. The generic claims mostly pertained to taste and flavour,
mirroring the types of non-regulated generic claims typically displayed on food and beverage packaging in the sample countries. The claims used in this study are listed in Table 5.

In sum, for each of the 12 foodstuffs six different versions of the packaging was designed to create the following variables, [1] image present + nutrient claim, [2] image present + health claim, [3] image present + generic claim, [4] image absent + nutrient claim, [5] image absent + health claim, [6] image absent + generic claim. Figure 25 illustrates the six versions of one foodstuff (skimmed milk). Finally, further parallel versions of each foodstuff packaging were created with the text translated from English into Dutch, German, Slovenian and Spanish. The entire stimulus set for this study therefore comprised 360 different packages [6 different health functions x 2 different food exemplars x 2 (image-present vs. image-absent) x 3 (generic vs. nutrition vs. health claim) x 5 languages]. The UK version of the stimulus packaging can be seen in Appendix AA.

8.10 Procedure

8.10.1 Encoding phase. Participants completed this study online and in their own time. Participants meeting the recruitment criteria received a standardised email from the panel company inviting them to participate in the study. This email contained a hyperlink, to the online study, and instructions to follow this link should they wish to participate. On clicking the hyperlink participants were taken to a ‘welcome screen’ that provided them with some background information about the study and what would be required of them should they choose to participate (Appendix X). Those wishing to participate were then asked to complete the consent form (Appendix W). On commencing the study, the participant viewed a series of 12 foodstuff packages, presented sequentially and in random order. Each package appeared alone on screen for 20 seconds. Participants were asked to study the package during this time and to remember as much as possible about it. Every participant saw six image-present products and six image-absent products, and within each of these image conditions they saw two with a generic claim, two with a nutrition claim, and two with a health claim. The assignment of products to image and claim-type conditions was fully counterbalanced across participants. After seeing all 12 products, participants completed a 3-minute filler task, in which they
Figure 25. Examples of carrier packaging displaying text-based claims and a function image. Package example – skimmed milk - with generic claims (panels a. and b.), nutrition claims (c. and d.), and health claims (e. and f.). Exemplars in the left column represent the image-absent condition; those in the right column the image-present condition. In this case the corresponding function image is a stretching human figure with bone illustration.
solved logic puzzles presented on the screen, after which they were moved on automatically.

8.10.2 Free recall phase. On completion of the filler task, the recall phase began. On-screen instructions outlined the task for participants in their own language. Participants were once again sequentially shown the 12 packages that they viewed in the encoding phase, in a new random order. However, this time a black panel obscured the written claim on each package. For each package, participants were asked to recall as closely as possible the now obscured claim and to type their response into a text-box provided (See Figure 26).

8.10.3 Recognition phase. As with the recall phase, participants were again shown the 12 packages they had viewed in the encoding phase, sequentially and in a new random order. Again, a black panel obscured the written claim on each package. However, in this phase each package was displayed together with a list of six claims. On-screen instructions asked participants to select from the list the claim that they had seen during the encoding phase and that was now obscured on the packaging. The six claims included the corresponding generic, nutrition, and health claims that were used in the encoding phase (for each participant, one of these three would be the correct answer), plus three fillers, all presented in a random order (See Figure 27). Finally, participants were asked to give some basic demographic data. On completion of this questionnaire, participants were provided with a written debriefing (Appendix Y). Figure 28 shows an overview of the procedure used in this study.

8.11 Ethics

This study received a favourable opinion from the University of Surrey Ethics Committee. A letter confirming this can be found in Appendix Z.
Write the sentence that has been removed from the packaging in the box below. Please be as accurate as possible.

Figure 26. Screenshot of the free recall task from Study 6.

Select the statement from the list below that you remember seeing on the product’s packaging.
- Naturally high in fibre
- Fibre contributes to normal bowel function
- Delicious new recipe
- Free from artificial colours
- No added sugar
- A family favourite

Figure 27. Screenshot of the recognition task from Study 6.
Figure 28. Diagram of the overall procedure used in study 6.
8.12 Initial Data Screening

8.12.1 Coding of recall data. Given the complexity of the task, it was expected that participants would rarely, if ever, recall the claims verbatim. Therefore, rather than focusing on absolute memory accuracy, responses were instead coded in terms of their level of specificity; that is, whether the participant recalled each claim as a generic claim, nutrition claim, or health claim. To this end, translators who were blind to condition translated every response into English. I next coded each response, as either, a generic, nutrition or health claim, or as an omission. I was also blind to condition. Responses coded as omissions were those indicating, “don’t know”, or that were otherwise irrelevant to the task. Across the sample, participants gave claim – like responses (i.e., not omissions) in 71.1% of cases. A second researcher also coded 22% of responses; inter-rater agreement was 98.9% (Cohen’s κ = .99), therefore my codings were used for the analysis of recall data.
<table>
<thead>
<tr>
<th>Specific nutrient or substance</th>
<th>Nutrient Claim</th>
<th>Function Claim</th>
<th>Generic Claim</th>
<th>Health Relationship</th>
<th>Carrier Product</th>
<th>Functional Health Image</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Beta-Glucans</strong></td>
<td>High in Beta-Glucans</td>
<td>Beta-Glucans contribute to the maintenance of normal blood cholesterol levels*</td>
<td>Traditionally prepared</td>
<td>Maintenance of normal blood cholesterol concentrations</td>
<td>Porridge Oats</td>
<td><img src="image" alt="Heart" /></td>
</tr>
<tr>
<td></td>
<td>Contains naturally derived Beta-Glucans</td>
<td>Beta-Glucans have been shown to promote the maintenance of normal blood cholesterol levels.</td>
<td>Terrific new taste</td>
<td></td>
<td>Oat biscuits</td>
<td></td>
</tr>
<tr>
<td><strong>Calcium</strong></td>
<td>A source of Calcium</td>
<td>Calcium is needed for the maintenance of normal bones*</td>
<td>Great tasting</td>
<td>Maintenance of normal bones</td>
<td>Skimmed Milk</td>
<td><img src="image" alt="Skimmed Milk" /></td>
</tr>
<tr>
<td></td>
<td>Enriched with Calcium</td>
<td>A source of Calcium for the maintenance of healthy bones.</td>
<td>Full of flavour</td>
<td></td>
<td>Cheddar Cheese</td>
<td></td>
</tr>
<tr>
<td><strong>Carbohydrate/electrolyte solution</strong></td>
<td>A carbohydrate-electrolyte solution</td>
<td>Carbohydrate-electrolyte solution contributes to the maintenance of endurance performance during prolonged endurance exercise*</td>
<td>Available in new flavours</td>
<td>Maintenance of endurance performance.</td>
<td>Energy Drink</td>
<td><img src="image" alt="Energy Drink" /></td>
</tr>
<tr>
<td></td>
<td>An important source of carbohydrate</td>
<td>Carbohydrates are the preferred source of fuel for muscles during exercise.</td>
<td>Traditional Recipe</td>
<td></td>
<td>Cereal Bar</td>
<td></td>
</tr>
<tr>
<td><strong>Vitamin D</strong></td>
<td>Source of Vitamin D</td>
<td>Vitamin D contributes to the maintenance of healthy teeth*</td>
<td>New improved flavour</td>
<td>Maintenance of normal teeth</td>
<td>Natural Yogurt</td>
<td><img src="image" alt="Natural Yogurt" /></td>
</tr>
<tr>
<td></td>
<td>Contains Vitamin D</td>
<td>Contains Vitamin D for the maintenance of healthy teeth.</td>
<td>Packed full of flavour</td>
<td></td>
<td>Drinking Yogurt</td>
<td></td>
</tr>
<tr>
<td><strong>Rye Fibre</strong></td>
<td>High Fibre</td>
<td>Fibre helps maintain a normal bowel function</td>
<td>Easy to cook</td>
<td>Changes in bowel function</td>
<td>Wholegrain Pasta</td>
<td><img src="image" alt="Wholegrain Pasta" /></td>
</tr>
<tr>
<td></td>
<td>Naturally high in fibre</td>
<td>Fibre contributes to normal bowel function*</td>
<td>Delicious new recipe</td>
<td></td>
<td>Wholegrain Bread</td>
<td></td>
</tr>
<tr>
<td><strong>Zinc</strong></td>
<td>Source of Zinc</td>
<td>Zinc contributes to normal cognitive function*</td>
<td>Fantastic new taste</td>
<td>Cognitive Function</td>
<td>Fish Fingers</td>
<td><img src="image" alt="Fish Fingers" /></td>
</tr>
<tr>
<td></td>
<td>Naturally high in Zinc</td>
<td>Zinc aids in the maintenance of normal cognitive function</td>
<td>Bursting with flavour</td>
<td></td>
<td>Peanuts</td>
<td></td>
</tr>
</tbody>
</table>

*Denotes Function claims worded as per the EU register
RESULTS

8.13 Data Analysis

Participants’ responses were collected using the online survey software, Qualtrics. These responses were initially exported to MS Excel for initial data screening and coding, and then to SPSS version 21 (IBM Corp., 2012) for analysis.

Data were analysed in the following ways.

8.13.1 Free recall data

(i) Differences in the proportion of each claim type (Generic, Nutrition, Health) recalled as health claims by the participants were assessed using a repeated-measures analysis of variance (ANOVA). Post-hoc t-tests were performed where appropriate;

(ii) Differences in the proportion of each claim type recalled as health claims by participants in the five sampled countries (Germany, Netherlands, Slovenia, Spain, UK) were assessed using a mixed-factor ANOVA;

(iii) The data was screened for omissions. Then reanalysed for differences in the proportion of each claim type recalled as health claims by participants using a repeated-measures ANOVA. Post-hoc t-tests were performed where appropriate;

(iv) Differences in the proportion of cases in which participants correctly recalled the claim as the correct claim type was assessed using a repeated-measures ANOVA. Post-hoc t-tests were performed where appropriate;

(v) Differences in the proportion of cases in which participants correctly recalled the claim as the correct claim type by sampled country was assessed using a mixed-factor ANOVA. Where appropriate, a post-hoc pairwise comparison was performed.

8.13.2 Recognition data

(vi) Differences in the proportion of each claim type recognised as health claims was assessed using a repeated-measures ANOVA. Post-hoc t-tests were performed where appropriate;

(vii) Differences in the proportion of each claim type recognised as health claims by sampled country was assessed using a mixed-factor ANOVA.
8.14 Recall Analysis

8.14.1 Recalled as a health claim. Of particular interest to the research question for this study was whether the presence of function images on product packaging would lead people to recall claims (correctly or incorrectly) as function claims. That is, would participants ‘falsely’ remember reading a function claim on the products’ packaging, when in reality they had seen either a nutrition or a generic claim. To this end, the proportion of each claim type that were recalled as health claims was calculated and are illustrated in Figure 29. In addition, a 2(Function Image: Present vs. Absent) x 3 (Claim Type: Generic vs. Nutrition vs. Health) repeated – measures ANOVA was conducted and revealed that the presence of a function image did indeed lead to a significant increase in recalling claims as health claims, \( F[1, 371] = 30.50, \ p < .001, \eta^2_p = .08 \). A significant main effect of claim-type was also identified, suggesting an overall difference in the proportion of health claims recalled for each claim-type, \( F[2, 742] = 216.02, \ p < .001, \eta^2_p = .368 \). A significant interaction effect was also found, \( F[2, 742] = 3.30, \ p = .04, \eta^2_p = .01 \). As predicted, post-hoc t-tests indicate that the presence of function images on the products’ packaging significantly increased the proportion of correct recall by the participants of health claims as health claims, \( M_{present} = .41, \ SD = .39, M_{absent} = .33, \ SD = .38; \ t[371] = 3.85, \ p < .001, d = .20 \). Furthermore, the presence of these images also significantly increased the proportion of false recall of nutrition claims as health claims, \( M_{present} = .13, \ SD = .25, M_{absent} = .06, \ SD = .18; \ t[371] = 4.86, \ p < .001, d = 0.26 \). However, the presence of function images did not significantly increase the false recall of generic claims as health claims, \( M_{present} = .10, \ SD = .23, M_{absent} = .08, \ SD = 21; \ t[371] = 1.58, \ p = .12, d = .08 \).

8.14.2 Recalled as health claims by country. To examine whether the finding that presence of function images leads to a significant increase in recalling claims as health claims varied across the sample countries, a 2(Function Image: Present vs. Absent) x 3(Claim Type: Generic vs. Nutrition vs. Health) x 5(Country: Germany vs. Netherlands vs. Slovenia vs. Spain vs. UK) mixed-factor ANOVA was conducted. This analysis revealed no significant interaction of function image and country, \( F[1, 367] = 0.22, \ p = .93, \eta^2_p = .00 \). That is, the presence of function...
images did not significantly influence recall, whether true or false, in any one country more than another. There was also no significant interaction of claim type and country, \( (F[8, 734] = 1.29, p = .25, \eta^2_p = .01) \). The 3-way interaction between factors was also non-significant, \( (F[8, 734] = 1.08, p = .38, \eta^2_p = .01) \).

8.14.3 Recall of health claims (excluding omissions). Analysis revealed that the presence of a function image on the product’s packaging did indeed lead to a significant increase in recalling claims as health claims. However, it is possible that such an effect might, in part, be driven by participant guessing. The analysis was therefore repeated after the data was first screened for omissions. I reasoned that participants who made a high number of omissions could have poor memory, and it would therefore be interesting to analyse the data with these people removed. Participants who made 5 or more omissions in response to the 12 recall questions were removed from the data set. This resulted in the removal of 120 participants (UK = 36, Slovenia = 0, Netherlands = 25, Germany = 34, Spain = 25) with the remaining sample size 252. Overall, 58.9% of responses (excluding omissions) were at the correct level of specificity, significantly above the 33.3% expected, and an increase from the original 51.1% responses (including omissions). A 2(Function Image: Present vs. Absent) x 3(Claim Type: Generic vs. Nutrition vs. Health)
repeated-measures ANOVA was again performed. Once again the analysis revealed that the presence of a function image lead to a significant increase in participants’ recalling claims as health claims, \((F[1, 251] = 29.13, p < .001, \eta^2_p = .10)\). As expected a significant main effect of claim type was also found, \((F[2, 250] = 115.05, p < .001, \eta^2_p = .479)\) as was the interaction effect, \((F[2, 250] = 3.35, p = .04, \eta^2_p = .03)\). Post-hoc t-tests confirmed the findings of the previous analysis. Specifically, they showed that the presence of function images significantly increased correct recall of health claims as health claims, \((M_{\text{present}} = .50, SD = .38, M_{\text{absent}} = .40, SD = .39; t[251] = 3.77, p < .001, d = .24)\), and that function images also increased the false recall of nutrition claims as health claims, \((M_{\text{present}} = .17, SD = .28, M_{\text{absent}} = .08, SD = .19; t[251] = 4.94, p < .001, d = .32)\). As with the previous analysis function images were found not to significantly increase the false recall of generic claims as health claims, \((M_{\text{present}} = .14, SD = .26, M_{\text{absent}} = .11, SD = .24; t[251] = 1.37, p = .17, d = .09)\).

8.14.4 True recall. In the interest of completeness, it is important to understand what, if any, influence the presence of function image has on participants’ true – or correct - recall of claims. To this end, the proportion of cases in which participants correctly recalled the claim as the correct claim type, was calculated and are illustrated in Figure 30. It is important to note that this data was coded in terms of its level of specificity and therefore do not necessarily reflect absolute memory accuracy. A 2(Function Image: Present vs. Absent) x 3(Claim Type: Generic vs. Nutrition vs. Health) repeated-measures ANOVA was conducted. The analysis revealed a marginally significant main effect of function image, \((F[1, 371] = 2.87, p = .09, \eta^2_p = .01)\) and a significant main effect of claim type, \((F[2, 742] = 32.26, p < .001, \eta^2_p = .08)\). A significant interaction effect was also found, \((F[2, 742] = 6.17, p = .002, \eta^2_p = .02)\). Post-hoc t-tests show that the presence of a function image on the products’ packaging significantly increased the proportion of health claims correctly recalled as health claims, \((M_{\text{present}} = .41, SD = .39, M_{\text{absent}} = .33, SD = .38; t[371] = 3.85, p < .001, d = .20)\). However, the presence of a function image did not significantly increase participants’ correct recall of either nutrition claims, \((M_{\text{present}} = .49, SD = .41, M_{\text{absent}} = .51, SD = .40; t[371] = -1.14, p = .25, d = -.06)\) or generic claims, \((M_{\text{present}} = 36, SD = .38, M_{\text{absent}} = .35, SD = .40; t[371] = 0.287, p = .77, d = .01)\).
To examine whether the influence of function images on true recall of claim type varied between sampled countries, a 2(Function Image: Present vs. Absent) x 3(Claim Type: Generic vs. Nutrition vs. Health) x 5(Country: Germany vs. Netherlands vs. Slovenia vs. Spain vs. UK) mixed-factor ANOVA was conducted. The analysis revealed a significant interaction effect of function image and country, \( (F[4, 367] = 11.94, p < .001, \eta_p^2 = .12) \) suggesting that the influence of the function images on true recall of claim type was not consistent across the sampled countries. A significant interaction effect between claim type and country was also found, \( (F[8, 734] = 32.39, p = .02, \eta_p^2 = .02) \). A significant 3-way interaction between the factors was also shown, \( (F[8,734] = 6.39, p < .001, \eta_p^2 = .07) \). A post-hoc pairwise comparison elucidated these findings by establishing that, when the function image was absent from the products’ packaging the proportion of correctly recalled generic claims by Slovenian participants varied significantly from those recalled by participants in the other sampled countries. This effect can be seen in Table 6 that gives the proportion of each claim correctly recalled as claim type in the five sampled countries.
Table 6. Proportion of claims correctly recalled as claim-type, overall and split by country (standard deviations in parentheses).

<table>
<thead>
<tr>
<th>Country</th>
<th>Image-Present</th>
<th></th>
<th></th>
<th>Image-Absent</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Generic</td>
<td>Nutrition</td>
<td>Health</td>
<td>Generic</td>
<td>Nutrition</td>
<td>Health</td>
</tr>
<tr>
<td>Total</td>
<td>.36 (.38)</td>
<td>.49 (.41)</td>
<td>.41 (.39)</td>
<td>.35 (.40)</td>
<td>.51 (.40)</td>
<td>.33 (.38)</td>
</tr>
<tr>
<td>Germany</td>
<td>.38 (.37)</td>
<td>.46 (.41)</td>
<td>.39 (.37)</td>
<td>.44 (.43)</td>
<td>.54 (.41)</td>
<td>.31 (.37)</td>
</tr>
<tr>
<td>Netherlands</td>
<td>.35 (.38)</td>
<td>.46 (.40)</td>
<td>.37 (.37)</td>
<td>.43 (.39)</td>
<td>.50 (.37)</td>
<td>.32 (.37)</td>
</tr>
<tr>
<td>Slovenia</td>
<td>.51 (.40)</td>
<td>.60 (.39)</td>
<td>.46 (.38)</td>
<td>.08 (.20)</td>
<td>.56 (.43)</td>
<td>.35 (.43)</td>
</tr>
<tr>
<td>Spain</td>
<td>.36 (.36)</td>
<td>.50 (.42)</td>
<td>.48 (.41)</td>
<td>.45 (.41)</td>
<td>.47 (.40)</td>
<td>.39 (.41)</td>
</tr>
<tr>
<td>UK</td>
<td>.22 (.35)</td>
<td>.44 (.41)</td>
<td>.37 (.40)</td>
<td>.35 (.40)</td>
<td>.50 (.39)</td>
<td>.28 (.31)</td>
</tr>
</tbody>
</table>

8.15 Recognition Analysis

8.15.1 Recognised as health claims. A 2(Function Image: Present vs. Absent) x 3(Claim Type: Generic vs. Nutrition vs. Health) repeated-measures ANOVA, examined the proportion of cases in which participants (correctly or incorrectly) picked the health claim, from the list of six options, as the one they had previously seen on the package during the encoding phase; these data are illustrated in Figure 31. The findings of this analysis revealed a significant main effect of function image, ($F[1, 371] = 29.15, p < .001, \eta^2_p = .07$) suggesting that when the function image was present, participants were more likely to choose the health claim. There was also a significant main effect of claim type, ($F[2, 370] = 254.40, p < .001, \eta^2_p = .58$). There was no significant interaction between function image and claim-type, ($F[2, 370] = 1.22, p = .30, \eta^2_p = .01$). As predicted, the post-hoc $t$-tests indicate that the presence of the function images significantly increased true recognition of health claims ($M_{\text{present}} = .60, SD = .40, M_{\text{absent}} = .55, SD = .39; t[371] = 2.21, p = .03, d = .11$). Function image also significantly increased false recognition of both nutrition claims as health claims ($M_{\text{present}} = .24, SD = .33, M_{\text{absent}} = .15, SD = .27; t[371] = 4.28, p < .001, d = .22$) and generic claims as health claims, ($M_{\text{present}} = .18, SD = 29; M_{\text{absent}} = .12, SD = .24; t[371] = 3.41, p = .001, d = .18$).
Recognition as health claims by country. A 2(Function Image: Present vs. Absent) x 3(Claim Type: Generic vs. Nutrition vs. Health) x 5(Country: Germany vs. Netherlands vs. Slovenia vs. Spain vs. UK) mixed-factor ANOVA was performed, to investigate whether the proportion of cases in which participants – correctly or incorrectly – selected the health claim as the one they had seen previously varied across the sampled countries, these data can be seen in Table 7. The analysis revealed no main effect or interaction involving the variable of country. Specifically, it revealed no significant interaction between function image and country, \( F[4, 367] = 0.32, p = .86, \eta_p^2 = .00 \) no significant interaction between claim and country, \( F[8, 734] = .875, p = .537, \eta_p^2 = .01 \) and no significant 3-way interaction between image, claim and country, \( F[8, 734] = .878, p = .535, \eta_p^2 = .001 \).
Table 7. Proportion of claims recognised by participants, overall and split by country (standard deviations in parentheses).

<table>
<thead>
<tr>
<th>Country</th>
<th>Generic</th>
<th>Image-Present Nutrition</th>
<th>Health</th>
<th>Generic</th>
<th>Image-Absent Nutrition</th>
<th>Health</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>0.18 (.29)</td>
<td>0.24 (.33)</td>
<td>0.60 (.40)</td>
<td>0.12 (.24)</td>
<td>0.15 (.27)</td>
<td>0.55 (.39)</td>
</tr>
<tr>
<td>Germany</td>
<td>0.20 (.30)</td>
<td>0.28 (0.36)</td>
<td>0.67 (0.36)</td>
<td>0.16 (0.37)</td>
<td>0.18 (0.29)</td>
<td>0.61 (0.37)</td>
</tr>
<tr>
<td>Netherlands</td>
<td>0.18 (0.27)</td>
<td>0.29 (0.32)</td>
<td>0.58 (0.41)</td>
<td>0.12 (0.25)</td>
<td>0.15 (0.30)</td>
<td>0.56 (0.37)</td>
</tr>
<tr>
<td>Slovenia</td>
<td>0.18 (0.32)</td>
<td>0.23 (0.34)</td>
<td>0.59 (0.39)</td>
<td>0.06 (0.17)</td>
<td>0.15 (0.24)</td>
<td>0.55 (0.42)</td>
</tr>
<tr>
<td>Spain</td>
<td>0.16 (0.29)</td>
<td>0.16 (0.26)</td>
<td>0.61 (0.43)</td>
<td>0.14 (0.27)</td>
<td>0.14 (0.24)</td>
<td>0.52 (0.44)</td>
</tr>
<tr>
<td>UK</td>
<td>0.15 (0.26)</td>
<td>0.23 (0.32)</td>
<td>0.53 (0.41)</td>
<td>0.11 (0.21)</td>
<td>0.14 (0.26)</td>
<td>0.51 (0.38)</td>
</tr>
</tbody>
</table>
DISCUSSION

This study aimed to expand on the findings of the previous studies presented in this thesis with three further aims. Firstly, this study aimed to examine whether the effects found in Studies 4, 5 and 6 extend to a free recall task. Secondly, it aimed to compare the effect of function images on people’s memory for different types of health claims, and finally, it aimed to extend the previous findings to a more diverse and representative participants sample – one representative of the ‘average consumer’.

It is an aim of this study to extend the current memory-based paradigm so as to see whether the effects found in previous studies extend to a free recall task. It was hypothesised that if these implicit or explicit inferences are formed without prompting, then participants should generate the false information themselves rather than only affirming false information suggested to them at test. Data from the recall phase of this study suggest that the presence of a function image on the product packaging, increased correct recall of health claims. Arguably this finding, taken together with the findings from Study 5, offer compelling evidence of spontaneous inferences, more so than simple affirmation of recognising a test item. Thus these findings confirm that images can act as health claims by leading people to infer health benefits without prompting.

A further aim of this study was to compare the effect of function images on participants’ memory for different types of claim – specifically, nutrition, health and generic claims. Current EC legislation distinguishes between nutrition claims – which simply make reference to ingredients or constituents of a product – and health claims, which make assertions about a specific health benefit provided through consuming that product or its constituents (EC, 2006). It was predicted that, when products carry health claims, the presence of function images would facilitate correct recall and recognition of these claims. Indeed, data from both the recall and recognition tasks indicate that the presence of a function image increased correct recollection. In addition, it was also predicted that for products carrying nutrition claims, function images would increase the likelihood that these claims would be ‘upgraded’ to health claims in participants’ memory. That is to say, people who viewed a nutrition claim together with a function image, would when asked to either
free recall or recognise that claim, falsely recall/recognise it as a health claim. The data confirm this prediction, indicating that function image significantly increased both false recognition and false recall of nutrition claims as health claims. This finding is reflective of previous research that suggests that people seem to infer a product’s general healthfulness on the basis of a specific claim (Aschemann-Witzel & Hamm, 2010) – an effect referred to as the ‘magic-bullet’ (Roe et al., 1999). Although, the data from this study suggests the reverse effect, that is, participants were inferring a specific health benefit based on a more general nutrition claim. However, the same effect was not found for free recall of generic claims - that is, generic claim were not being ‘upgraded’ to health claims in participants’ memory. This finding itself could be indicative of heuristic processing as the ‘cognitive distance’ between the generic claim and the health function implied by the image was too great for fluent processing, and/or, too inconsistent with evoked schemas to be an effective component of heuristic decision-making.

The final aim of this study was to test this memory-based measure with a sample more representative of the ‘average consumer’. This was pertinent given that the legislation specifically states that “health claim shall only be permitted if the average consumer can be expected to understand the beneficial effects as expressed in the claim” (EC, 2006, Art. 5.2). To this end, participants were selected from five European member states. It is therefore important to note that there was no cross-country variations in outcome. This is a significant finding given the diversity in consumer habits and historic differences in food labelling and claim use between the EU member countries. However, the findings from this study do suggest that the function images have the potential to mislead or persuade the consumer, insofar as they consistently lead participants to falsely recall or recognise health claims that they had not truly read. This finding supports the standpoint that images can act as health claims, and both fits with, and expand on current literature. However, it also underscores the importance of regulating imagery on product packaging.

8.16 Methodological Limitations

Although this study overcomes many of the limitations of the previous ones, it is not without its own limitations. For example, all the products and their claims used in this study were congruent; that is, they were naturally occurring
combinations – such as a calcium claim on milk. There is evidence to suggest that consumers prefer more naturally occurring combinations of claim and product (Krutulyte et al., 2011), and thus it would be of interest to see how incongruent combinations influence consumers’ memory for claims. Other limitations arise from the study’s design – an online experiment. Although this design allowed for the careful control of variables, it did also mean participants were aware they were in an experiment and were to be tested on the foods and beverages they saw. Thus it would lend greater weight to the conclusion that function images promote unprompted inferences about health, as well as to the external validity and robustness of the effects, were they to be replicated under more ‘real world’ conditions. Further limitations of this study relate to the choice of stimulus material. As with previous studies the product packaging designs were fictitious so as to avoid bias arising from prior exposure to either product or brand. However, we are repeatedly exposed to both products and brands on a near daily basis, and thus it would be of great relevance when considering the influence of packaging imagery on people’s understanding of a product’s health function to consider familiar rather than just novel products.

8.17 Conclusion

The data from this study provide further evidence that function images on product packaging can lead consumers to infer health claims and, through demonstrating that the effect extends to a free recall task, lend weight to the notion that these inferences occur spontaneously and outside of conscious control. Furthermore, the findings that function images can upgrade a nutrition claim in people’s memory to the status of a health claim, suggest that function images may have a subtle yet pervasive effect on consumer cognition.
9.1 Chapter Overview

This final chapter will draw together the findings from each of the seven studies presented in this thesis, and discuss them both in relation to the overarching research question, and their position within the current literature. The potential implications of these findings for the regulation of images on product packaging will also be discussed. Possible applications for an indirect memory-based measure, such as the one utilised in this thesis, will be explored together with potential limitations of using such a measure. This chapter will conclude with recommendations for future research.

9.2 Summary of Findings

The overarching aim of this thesis was to examine the role of packaging imagery in people’s understanding of product’s health functions. Specifically, it set out to establish whether images, on the packaging of food, beverages and dietary supplements, could act as health claims in a similar way to written claims by priming consumers’ expectations and inferences as to the products health function. This aim was developed in light of current EC legislation on the use of health claims, which applies equally to the use of images as well as to text, as it assumes that images can lead consumers to make health-related inferences about the product (Wartell et al., 2011). In particular, a question mark existed over the validity of this assumption. That is, do consumers – consciously or unconsciously – treat packaging imagery as offering informational value? It was therefore the aim of studies 1-3 to test this legislative assumption and to build on the existing body of research, which had primarily used direct measures in an attempt to answer this and similar questions (e.g., Lähteenmäki et al., 2010, Wansink, 2003, Grunert et al., 2011). These 3 studies made use of conventional ‘direct’ reporting methods to examine the influence of packaging imagery on people’s beliefs about the health properties of foods and dietary supplements. However, direct methods, such as these, might elicit inferences that would not be made unprompted, and thus might fail to capture inferences made
implicitly without conscious awareness. Studies 4-7 therefore aimed to test a novel indirect memory-based experimental paradigm to explore whether packaging imagery elicits health inferences without prompting, and the extent to which these inferences are made implicitly.

9.2.1 Study 1. This first study was intended as a manipulation check to determine whether people were indeed using imagery present on product packaging – specifically, function imagery – to draw inferences as to product’s health function. Furthermore, it aimed to determine whether this packaging imagery was influencing participants’ beliefs in the accuracy of health claims made for products. To this end, twenty-six undergraduate students took part in a computer-based laboratory experiment. The participants were required to view a series of fictitious dietary supplement packages – which either displayed or did not display a function image – and rate the accompanying health claims on a Likert scale for the degree to which they believed each claim to be true or false for the shown product. The data for this study confirmed the assumption, that people use the imagery present on product packaging to draw inferences about that product’s health function. Specifically, the data indicated that written health claims shown alongside packaging displaying a congruent function image, were rated by the participants as more likely to be true, than health claims shown alongside packaging absent of a function image, or packaging displaying an incongruent image. In sum, these findings support the assertion made in legislation, and also add to the body of evidence, that suggests images can act as health claims (e.g., Carrillo et al., 2014, Saba et al., 2010). However, it should be noted that this study was limited insofar as it used a small sample of university students in a laboratory-based experiment.

9.2.2 Study 2. In light of these findings from Study 1, this second study aimed to test the reliability of the original findings through the use of a more diverse and representative sample gathered from three European countries (Italy, Romania, UK). This study further aimed to expand on the questions addressed in Study 1 by examining whether the presence of a function image on the packaging of fictitious dietary supplements would lead participants to alter their beliefs as to the potential risks and benefits of consuming these dietary supplements for their intended health function. Specifically, this study aimed to investigate whether these images would act as health claims so as to increase a person’s belief in the potential health benefits
of the product, relative to its potential risks. This study took the form of an online experiment completed by 546 participants. The participants were required to view fictitious product packaging – some of which displayed a function image and some of which did not display an image – and for each product, were asked to rate the likelihood that the product is used for one of eight possible health functions (e.g., sleep, bowel function, etc.). On completing these ratings the intended function of the product was revealed to the participant, together with two risks and two benefits of consuming the product. The participants were then required to rate, on three further Likert scales, the degree to which they believed that someone consuming the product for its intended function would benefit from the product and also the degree to which they believed them to be at risk from consuming the product. Participants were also asked to indicate the ratio of benefit to risk associated with consuming the product. The data from this study confirm the initial findings of Study 1. That is to say, participants judged written health claims to be more believable when they were displayed alongside products carrying a congruent function image, than when they were either displayed alongside product packaging carrying an incongruent image or no image. Furthermore, the data indicated that the presence of a function image on the packaging of the fictitious dietary supplement significantly increased participants’ perception as to the potential benefits of consuming the product for its intended function. The presence of a function image did not however significantly influence participants’ perception as to the potential risks associated with consuming the product. Results from the mediation analysis suggest that participant’s perception as to the potential benefits of consuming the product is mediated by their belief in the product’s function. That is to say, if a person believes a product is used for heart health, then they will perceive the benefits of taking this product to be greater for heart health, than if they take the product for another health issue. The findings from this study further support the assumption that images can act as health claims, insofar as they can influence people’s beliefs as to a product’s function. Specifically, these findings suggest that images prime consumers’ expectations as to a product’s function, and when these expectations are proved correct, they feel more positively towards the perceived benefits of consuming the product.

9.2.3 Study 3. The third study in this thesis took advantage of the occasion of the London 2012 Olympic Games to examine whether the presence of Official
Olympic logos – the Olympic Rings Logo and the London 2012 Logo – may act as a health claim when placed on the packaging of food and beverage products, insofar as they might communicate a message of general ‘healthfulness’ to the consumer. To this end, an online survey was created in which participants viewed a photograph of an official Olympic branded product, either in its original form – with the Olympic logo present – or in a doctored form – with the Olympic logo removed via Photoshop™. A photograph of the product was then viewed for a duration of 20 seconds, after which participants were required to “estimate the amount of fat/sugar/calories contained in the product”. Participants were next shown one of the two logos and asked to identify the brand and/or event represented by the logo. In addition, participants were asked to rate their agreement with the statement “food and drinks that bear the logo of the Olympic Games are required to be nutritious and healthy”, on a 7-point Likert scale. This survey was taken by 279 participants during the period of the London 2012 Olympic Games and the 5 days immediately preceding it. The data indicate that the presence of Olympic logos on food and beverage packaging had no significant effect on participants’ perception of the healthiness of these products, in terms of their fat, sugar and calorie content. These findings suggest that the Olympic logo does not act as a health claim when placed on product packaging, insofar as it does not prime consumers’ expectations as to the health benefits of the product. This is contrary to the findings of the previous two studies that suggest that images can act as health claims. However, it should be noted that the Olympic logos are not function images, insofar as they do not represent a specific health function, rather communicate a message of general ‘healthfulness’. A further explanation for these findings result from the fact that the Olympic logos represent multiple values and thus it is possible that participants inferred other messages from these images rather than a message of health.

9.2.4 Summary of studies 1-3. Together, the results of these studies lend support for the notion that images – specifically, function images – can indeed lead people to infer health properties of products. However, these studies also raise questions as to the nature and origin of these inferences. In addition, while the use of direct measures may offer valuable insight into the role of packaging imagery, they are not without their limitations. However, by virtue of using a memory task that involved no direct question, the data gathered from studies 4-7 extended on these
prior findings in several ways, as well as going some way towards answering
questions regarding the nature and origin of consumer inferences.

9.2.5 Study 4. The aim of Study 4 was to test a novel indirect memory-based
experimental paradigm in a controlled laboratory experiment. Specifically, this
study aimed to investigate whether the presence of function images on the packaging
of fictitious dietary supplement products would lead to the production of recognition
errors for associated health claims in the viewer. To this end, thirty-six
undergraduate students completed a computer-based memory task. This task
consisted of two phases. Phase one – the encoding phase – required participants to
study images of fictitious dietary supplement packaging as eight non-critical health
claims appeared in turn underneath each image. Each participant viewed a total of
six product packages – three with a function image and three without an image. On
completion of the encoding phase the recognition phase commenced. During this
phase participants once again saw the six product packages. Alongside each package
appeared a series of health claims – significantly, these health claims included some
previously unseen ‘critical’ health claims that related to the product’s function as
depicted by the function image. Participants were required to make a recognition
judgement by indicating whether or not they had previously seen a specific claim
with the shown product packaging. If the participants indicated that they had seen
the claim and product together during the encoding phase, they were required to
make a remember, know, guess judgement. The resulting data indicate that the
presence of function images on the packaging of fictitious dietary supplements,
primed consumers expectations as to the health properties of those products, as
evidenced by an increase in the number of recognition errors – consistent with the
implied function – produced by the viewer. Furthermore, these recognition errors
were not simply the result of guessing, that is, they were not driven by explicit
inferences. Rather, participants actually claimed to remember seeing the previously
unseen critical health claims, suggesting the effect was driven by implicit inferences.
These findings suggest that function images can act as health claims, insofar as they
can lead people to implicitly and spontaneously infer a health benefit from
consuming a specific product, and so have the potential to act as a source of
misinformation as well as a source of information.
9.2.6 Study 5. The data from the previous study – Study 4 – suggest that function images on product packaging can, in some cases, prime participants to draw inferences as to the health function of those products. The first aim of Study 5 was therefore to test the replicability of the effect of function images on false recognition shown in Study 4. In addition, the remember, know, guess data from Study 4 suggest that the inferences people draw as to the health properties of the products were largely implicit, insofar as the effect was not driven solely by guessing. The second aim of Study 5 was therefore to address more directly the question of whether the inferences people draw from the function images displayed on product packaging were the result of a considered decision-making process or whether, as the results of Study 4 suggest, occurred spontaneously. This was achieved through the addition of a forewarning. The methodology of this study was identical to that of Study 4, with the exception that half of the participants received an explicit warning prior to the encoding phase. Participants in the warning group were told by the experimenter – and again in the form of written information – that the computer had randomly assigned the function images to product packages, and thus could not be relied upon to determine the products’ function. For those in the no-warning group, the study procedure was identical to that used in Study 4. Data from this study indicate that the addition of a forewarning did not significantly reduce the occurrence of recognition errors made for critical items. Furthermore, the results of the remember, know, guess analysis found that forewarning had almost no effect on participants ‘remember’ or ‘know’ responses; however, the forewarning did moderate the effect of function images on the proportion of guess responses. In conclusion, the small and non-significant drop in recognition errors resulting from the addition of a forewarning appears, if anything, to reflect a strategic shift in guessing rather than a reduction in confident errors. This finding may therefore confirm both the implicit nature of images as well as the assertion that memory errors based on implicit false inferences are notoriously difficult to counter with corrective information (e.g., Guillory & Geracy, 2010).

9.2.7 Study 6. The purpose of Study 6 was to expand on the findings of Studies 4 and 5; by examining how image and text-based claims present on product packaging may interact to influence people’s memory for novel health claims. Specifically, this study aimed to investigate whether the congruence of these
packaging elements - image and text-based claims – would influence the production of recognition errors for novel critical health claims made by the viewer. The experimental procedure used in this study was identical to that of Study 4. However, for this experiment the stimulus material – that is, the front-of-pack labels – were adapted to display text-based health claims in addition to the function images. Some labels displayed only a text-based health claim and no image, whereas others displayed a text-based health claim and image that were congruent (i.e., both made reference to heart health), or a text-based health claim and image that were incongruent (i.e., one made reference to heart health and the other to another function, such as sleep). It was hypothesised that congruence between the function image and text-based health claim, would lead to an increased production of recognition errors by the viewer, in comparison to errors made for incongruent elements or when the function image was absent from the product packaging. The data from this study was indicative of this prediction, however not significantly so. Furthermore, the data suggest that this effect was not driven purely by guessing, however there was no clear indication from the data that any effect was driven by an increase in participant remembering either. Although the findings from this study were in a similar overall direction to those found in Studies 4 and 5, they were not significantly so. This study was limited both by its laboratory design and student sample, and suggest that further investigation between image and text-based health claims is necessary.

9.2.8 Study 7. The final study of this thesis presented an opportunity to further study the relationship between image and text-based claims on product packaging, as well as to build on the findings from my previous studies. The first aim of Study 7 was to expand my indirect memory-based measure and investigate whether the effects found in Studies 4 and 6 extended to a free recall task. That is, do people make similar memory errors when they attempt to reconstruct the health claims from memory, to those made when they performed the simple old/new judgements required in the recognition task used in Studies 4, 5 and 6? The second aim of this study was to compare the effect of function images on people’s memory for different types of packaging claims – namely, health, nutrition and generic claims. It was predicted that the presence of a function image on product packaging would increase the likelihood that nutrition claims would be ‘upgraded’ to health
claims in people’s memory. That is to say, people would use the function images on product packaging to infer that product’s function and produce a false memory of having seen a health claim – that is, a claim related to the function as depicted by the image, rather than the nutrition claim they had actually seen. The final aim of this study was to extend the previous findings to a more diverse and representative participant sample. To this end, instead of sampling only university students – as was the case in Studies 4, 5 and 6 – participants were selected from five European countries and across a range of ages and occupational backgrounds. The study itself took the form of an online experiment consisting of three phases; 410 participants took part in this experiment. During the initial encoding phase participants were required to study 12 food packages, each displayed on the screen for 20 seconds. These packages carried one of three claim types and either a function image or no image. After seeing all 12 products, participants solved logic puzzles on the screen for 3 minutes. For the free recall phase participants were again shown the 12 packages, this time with the claim obscured. Participants were required to recall, as closely as possible, the claim as it appeared on the product packaging. This was repeated for each of the 12 product packages. Similarly, for the recognition phase, participants were again shown the 12 product packages with the claims obscured. The recognition task required participants to select the claim they remember seeing on the product packaging from a list of six possible claims. The data for the free recall phase of this study suggests that the presence of a function image on the product packaging increased correct recall of health claims as health claims. Furthermore, this data suggests that function images act to ‘upgrade’ nutrition claims to health claims. That is, participants were falsely recalling nutrition claims as health claims. Similarly, the data for the recognition phase indicated that function images also lead to an increase in correct recognition of health claims as health claims. Function images were also found to increase false recognition of both nutrition and generic claims as health claims. No significant effect of country was found for either free recall or recognition. In sum, participants were consistently falsely recalling and recognising health claims that they had not truly read, and these errors increased when a function image was present on product packaging. These data both fit with and expand on current literature that suggests images can act as health claims in so far as they can prime people to infer a health benefit of a product.
9.2.10 Summary of studies 4-7. Together, the results of these studies lend good support for the notion that packaging imagery, can indeed lead people to infer health properties of products without prompting. In all four experiments, participants falsely recognised health claims that they had not truly read, and these recognition errors increased significantly when function images were present on the products’ packaging.

9.3 Implications for Theory

The data from the studies contained within this thesis strongly suggest that function images can act as health claims, insofar as they can prime our expectations as to a product’s function. There are several theoretical explanations that might account for such findings. One such explanation comes from dual-process theories that suggest that two qualitatively different modes of information processing operate in decision-making (Chaiken & Trope, 1999). The first mode – known as system 1 - is a fast, associative, information-processing mode, based on low-effort heuristics. The second mode – or system 2 - is a slow, rule-based information-processing mode based on high-effort systematic reasoning. Previous evidence has suggested that consumers primarily use heuristic processing – or system 1 – as a means to reduce the amount of information they need to search and evaluate before making a decision about a food based product (Payne, 1976, Verbeke, 2005, 2008). The notion that consumers use a more heuristic mode of processing is further supported by data obtained from the studies in this thesis which suggests that the inferences participants drew from the images were often implicit and occurred spontaneously, and outside of the participants’ conscious control, rather than through deliberate reasoning.

One type of heuristic reasoning is the use of schemas. Schemas allow us to hold expectations about a product’s function. When we encounter a new piece of information about that product – such as a function image on it’s packaging – an existing schema is evoked, against which this new information is evaluated. Furthermore, if the information encountered is consistent with the evoked schema, a positive evaluation – known as the Schema Congruity Effect - will result (Mandler, 1982, Flaherty & Mowen, 2010). This Schema Congruity Effect was in evidence in both Studies 1 and 2. In Study 1, participants evaluated health claims more positively – that is, they were more likely to be rated as true – when the health claim
was congruent with the image on the product packaging, compared to when that image was either incongruent or absent from the packaging. For instance, if the function image displayed on the product packaging were of a heart, schemas concerning heart function would have been evoked. Thus when this heart image was seen alongside a health claim that also relates to heart function, positive affect was felt towards the claim leading participants to rate it as more believable. In study 2, participants formed expectations as to the product’s function based on the packaging imagery, and then later when their expectations were confirmed as correct, positive affect was felt towards the product, leading to an increase in their perception as to the benefits of the product. However, if a schema is well developed – that is, a person has a strong pre-existing notion as to the product’s function – it is likely that they will pay close attention to packaging information that is consistent with their schema, and ignore information that is inconsistent with it (Fiske & Neuberg, 1990). This may go some way towards explaining the findings of study 3. The product packages used in Study 3 were all from well-known brands – Coca Cola, McDonalds and Cadbury’s – and thus participants likely had pre-existing schemas regarding these products. After viewing the product and evoking product consistent schemas – it is likely that the participants payed no further attention towards the specifics of the packaging, instead relying on a more heuristic mode of processing to make judgements as to the product’s function. This further raised the question as to the effectiveness of images as health claims where consumers hold strong pre-existing schemas for a product.

Another example of heuristic reasoning that could equally account for the findings from these studies - in particular, Studies 1 and 2 - is Processing Fluency. This is “the subjective experience of ease with which people process information” (Alter & Oppenheimer, 2009, p.219). This theory further suggests that easily processed – or ‘fluent’ - stimuli have a tendency to be ‘hedonically marked’ and are thus subsequently evaluated more positively (Reber et al., 1998). These feelings of positivity occur due to the sense of familiarity that arises when stimuli are easy to process (Bornstein & D’Agostino, 1992, 1994). Furthermore, fluent stimuli are also more likely to be judged as truthful regardless of their original source (e.g., Reber & Schwarz, 1999). Processing Fluency could therefore explain the feelings of positivity demonstrated by participants in Studies 1 and 2. People have also
reported greater feelings of confidence in their performance when a task is fluent (e.g., Kelly & Lindsay, 1993). However, as Alter and Oppenheimer (2009) point out, these feelings of confidence are not necessarily accompanied by greater task accuracy; suggesting that fluency artificially inflates a person’s assessment of their task accuracy. Thus Processing Fluency might provide a theoretical explanation as to the judgement ratings made by participants in Studies 4, 5 and 6. That is, the finding that guessing did not fully account for the production of recognition errors; rather participants were frequently confident that they had read these claims and, in some cases, claimed to actually remember seeing them.

The memory literature suggests that memory is fallible and not an accurate reproduction of an event or experience, but rather it is a reconstructed approximation. It further suggests that people frequently recall experiences rather differently from how they truly occurred, sometimes even recalling events that never truly occurred at all. These memory errors are thought to apply equally to all types of experiences – including our experiences with food and beverage products. I therefore proposed, in this thesis, that studying the memory errors people generate in certain contexts could offer insight into the beliefs and inferences that people must have formed in order for those errors to occur. I further proposed that using a novel indirect memory-based measure could go beyond the reach of explicit measures in assessing how consumers interpret health imagery.

People’s expectations and inferences ‘shape’ their memories. That is to say, we use our expectations and inferences to ‘fill gaps’ in our memories. The findings from Studies 4, 5, 6 and 7 that images – specifically, function images – can affect people’s inferences about health, fits with the small body of empirical literature that has used more direct methods (e.g., Carrillo et al., 2014, Saba et al., 2010). The memory literature would seek to explain these findings through theories such as the source-monitoring framework (Johnson et al., 1993). This theory suggests that inferences can distort memory because they promote thoughts and mental images, which, when later retrieved, feel much like memories for real experiences. For instance, during the encoding phase of the memory-based paradigm, participants were required to view product packaging. If that product packaging carried a function image of, say, a heart, this may make the participant think about heart health. Then during the recognition - or free recall - phase, claims about heart
function should come to mind easily and clearly, and feel familiar. These memory-like characteristics, in some cases, lead participants to falsely believe they had seen those claims before, rather than having only just thought of them. The findings from Studies 4, 5, 6 and 7 – those using a memory-based measure - therefore suggest that people cannot accurately distinguish between what they have explicitly read or seen and their own internally generated inferences. Thus the addition of a function image to product packaging, can therefore act as a source of misinformation, as it can lead to them falsely ‘remembering’ claims that they had not truly read.

The finding, from the studies using the indirect memory-based measure, that people form inferences without prompting, is of primary importance as it furthers our understanding of the type of inferences that are evoked by packaging imagery. For example, Johnson – Laird (1982) argued that there are two distinct types of inferences: explicit and implicit. He suggests that explicit inferences are made deliberately and consciously, by systematically considering and evaluating the available evidence. Whereas implicit inferences are made spontaneously and without conscious awareness, and often go beyond the available evidence (Johnson-Laird, 1982), thus people’s implicit inferences can lead them to ‘remember’ information that they spontaneously inferred, but never truly saw as evidenced by the memory errors produced in these studies. Specifically, the finding from Study 5 that the addition of a forewarning was ineffective in reducing recognition errors, strongly suggests that inferences formed in this context are implicit, that is, they are formed spontaneously and without prompting.

In sum, the studies presented in this thesis have indicated that consumers use a heuristic decision-making process when making judgements as to product’s health function, and that the inferences formed in response to viewing a function image appear to occur spontaneously and without prompting. Thus this data has gone some way towards an understanding of the theory underlying consumer understanding of product’s health function.

9.4 Implications for the Regulation of Images on Product Packaging

Data from the studies contained within this thesis confirm the assertion made in the legislation that images – specifically, function images – can act as health claims, by leading people to infer health benefits without prompting. These
inferences appear to often be implicit, and could therefore be highly pervasive. The data therefore underscore the importance of regulating imagery on product packaging.

The wording of the current EC legislation sates that; “A ‘claim’ means any message or representation, which is not mandatory under Community or national legislation, including pictorial, graphic or symbolic representation, in any form, which states, suggests or implies that a food has particular characteristics” (EC, 2006, Art 2.2.1). However, given the potential for images to lead or mislead the consumers - and the aim of the European Union to ensure that any claim made on a food’s labelling, presentation or advertising is clear, accurate and based on scientific evidence – it may be prudent to legislate under a more specific and singular definition as to the use of images as health claims. For example, the US Food and Drug Administration takes a similar stance to the EC with regards the use of images as health claims, and illustrates its legislation with an example stating that the heart-shaped symbol endorsed by the American Heart Association “is considered to be a health claim in that its heart shape characteristics suggest a relationship between the food whose label it is on and heart disease” (p.28). Currently, the European Food Safety Authority (EFSA) is responsible for authorising the use of each proposed health claim, and evaluating the scientific evidence supporting health claims. This procedure largely works on the premise that health claims will appear in a written form on the product packaging. Given the findings of the studies in this thesis, legislators may consider it timely to review such authorising procedures so as to better accommodate potential visual health claims. However, it is the very nature of images that presents a problem for legislators; the subjective and non-specific nature of images makes any procedural change a challenge. The memory-based paradigm presented in this thesis, may therefore offer some assistance in overcoming these challenges.

9.5 Applications for an Indirect Memory-Based Measure

The novel experimental paradigm presented in this thesis represents an example of how memory-based methods might help manufacturers and regulators quantify the extent to which specific packaging images may lead or mislead consumers. The importance of this quantification is especially salient when
considering the minimal effect of forewarning participants seen in Study 5. The findings of Study 5 would seem to suggest that interventions involving consumer education alone might not necessarily offer immunity to the misleading and suggestive powers of images given the apparent spontaneous nature of the consumer decision-making process. It must therefore fall to the regulators to ensure that, where images can act as health claims, these ‘visual’ health claims accurately reflect the health function of the product displaying them. However, where as regulators have a responsibility to protect the consumer from potentially misleading information, manufacturers have no such responsibility. One could easily see how advertisers and manufacturers might utilise a method such as this as a means by which to identify the most persuasive images for display on their products, while taking advantage of the minimal regulations as regards to the use of images as health claims. However, it should be cautioned that the intention of the manufacturer might not necessarily be to ‘mislead’ the consumer – rather to provide the most informative of packaging environments. Indeed, the use of images that could potentially be perceived as ‘misleading’ under the current regulations may not necessarily be a negative, as I explain below. Rather it highlights a need for further investigation and a tightening of the regulations with regards to the use of images, symbols and graphics as health claims, and a memory-based method such as this may prove a timely and useful toolkit by which to achieve this.

Where I have used terms such as ‘misleading’ and ‘suggestive to describe the potential effects of images on people’s understanding of health function, one might construe these findings differently. For example, the findings from Study 7 suggest that the presence of function images on product packaging can act to ‘upgrade’ a nutrition claim to a health claim. This may be construed as problematic under current EC legislation. People are failing to correctly remember the actual claim present on the product packaging, and thus these claims may inadvertently act as sources of misinformation rather than as sources of information. However, such errors may not necessarily have a negative impact on consumer understanding. If, for instance, an image of bones lead people to misremember “a source of calcium” (a nutrition claim) instead as “with calcium for strong bones” (a health claim), this error might indicate that the image facilitates consumer understanding. In this sense the bone image serves an educational function – helping people understand and
remember the function of calcium – which might otherwise be less well-served by a complex written claim (Wansink, Sonka, & Hasler, 2004). Indeed, in many cases marketers may use nutrition claims intentionally to lead consumers to infer health benefits. From a legislative perspective this educational function of packaging imagery, albeit positive at face value, could be troublesome. Approved claims are often lengthy and unwieldy because they communicate nuance about the limits of scientific consensus and problem size of any resulting benefit. To illustrate, consider the EU-approved health claim “carbohydrate-electrolyte solution contributes to the maintenance of endurance performance during prolonged endurance exercise” (EC, 2013). In contrast, images rarely communicate such nuances, being nonspecific or ambiguous, and thus might lead consumers to infer health benefits more numerous than or different from those supported by scientific evidence. Study 7, for example, used the function image of a running man in conjunction with this carbohydrate-electrolyte solution claim, and while in broad strokes this image can communicate themes such as ‘exercise’ and ‘performance’, it cannot possibly communicate the exact scientific benefits of the substance to the same extent as the written claim. This problem is potentially greater when function images are used in tandem with nutrition claims rather than health claims, as the former afford greater scope for consumers to infer health benefits that are unfounded. Whether images educate or miseducate will undoubtedly often depend on broader contextual factors such as these.

9.6 Limitations of Using an Indirect Memory-Based Measure

The use of an indirect memory-based measure has proved to be a useful method by which to build on findings produced via more direct methods. However, it is undoubtedly a less straightforward of a method in comparison to those direct methods. In addition, the value of uncovering implicit inferences may depend on the likelihood that they would influence people’s behaviour. One significant limitation of the memory-based paradigm presented in this thesis is that it only indicates whether the images lead people to infer that they saw a health claim. It does not directly tell us anything regarding people’s beliefs and attitudes towards those claims; it is the beliefs and attitudes people hold towards claims – one would presume – that is an important precondition if the inferences were to translate into behaviour.
Thus further research is necessary to more fully understand the relationship between the inferences made by consumers and their purchasing and consumption behaviours. For the studies contained in this thesis I utilised a number of direct measures - in addition to the indirect memory-based paradigm - to determine the role of images in people’s understanding of the health benefits of products, and in doing so overcame some of the limitations surrounding the use of this paradigm. Thus anyone whose aim extends beyond the pure identification of images that may lead or mislead the consumer would be advised to combine such a paradigm with more direct measures. That said, the use of such a paradigm for the identification of potentially leading or misleading images is not without its benefits, as outlined above.

9.7 Methodological Limitations

The studies presented in this thesis go a long way towards furthering our understanding of the role of packaging imagery – specifically, function imagery – in people’s understanding of products’ health benefits. However, these studies were not without their limitations. For example, in order to maintain a high degree of experimental control – and isolate the specific effects of packaging imagery – it was necessary for these studies to be conducted in either a laboratory, or an online, environment. Thus there remains a question mark over the extent to which packaging imagery will influence consumer inferences in a more realistic consumer environment, and indeed, whether such inferences will influence consumer behaviour. Consumer environments are complex and multifaceted, with a myriad of factors thought to influence consumer behaviour. For example, factors such as, consumer demographics (e.g., family size, income and cultural background), supermarket shelf configuration, knowledge of the store layout and availability of product information at the point-of-sale, are amongst those factors known to influence consumer purchasing behaviour (e.g., Park, Iyer, & Smith, 1989).

Alternative factors such as these were not taken into consideration in the present studies. Thus further research should aim to examine other more ecologically valid variables in relation to the role of packaging imagery on consumer inferences. One experimental tool that could be effective in overcoming the above limitations, while still allowing for the maintenance of experimental control is the ‘virtual supermarket’ (Van Herpen, Yu, Van den Broak, & Van Trijp, 2014). This computer-based
Simulation of a supermarket environment would allow for the experimental manipulation of the product packaging design as well as the store environment, such as the position of products on shelves, proximity of one product to another, price of products, and additional in-store product information. Thus the use of a tool such as this would accommodate experimental designs, similar to those in this thesis, while at the same time increasing the overall ecological validity of the studies.

A further limitation of the studies presented in this thesis regards the stimulus materials; in particular, the use of fictitious product packages in Studies 1, 2, 4, 5, 6 and 7. Although the health claims and images displayed on the product packaging were taken from real products available for sale in the EU, or in the case of Study 7, from the EC register of nutrition and health claims made on foods (EC, 2013), the product packages themselves were of fictional design. The decision to create fictitious product packaging designs was made in an effort to avoid bias from participants’ pre-existing knowledge and attitudes of brands. These studies can therefore be said to be limited in that they are only representative of the inferences people may form when experiencing ‘novel’ – that is, previously unseen - products. This may be regarded as limiting as many of our experiences with products – particularly food and beverage products - tend to be ‘repeat’ experiences. That is, we have had prior experience with, and therefore have pre-existing knowledge of, a product. It may therefore be of value for future research to investigate the role of images – and the resulting inferences – with regards to more familiar products. This would be of particular interest given the findings of Study 3 - the only study in this thesis to use pictures of actual product packaging as its stimulus material – which appear to suggest that the presence of imagery on the packaging was insufficient to override people’s pre-existing attitudes and beliefs towards the products.

9.8 Involvement in EU 7th Framework Projects.

Studies 2 and 7 received external funding from two European Union 7th Framework projects. Study 2 received funding for the recruitment of participants and dissemination of research findings from the PlantLIBRA (PLANT food supplements: Levels of intake, Benefit and Risk Assessment) project. This project aimed to foster the safe use of food supplements containing plants or botanical preparations by increasing science-based decision-making by regulators and food
chain operators. Study 7 received external funding for the recruitment of participants and dissemination of research findings from the CLYMBOL (Role of Health-Related Claims and Symbols in Consumer Behaviour) project, which aims to determine how health-related claims and symbols are understood by consumers and how they affect purchasing and consumption. Although funding from these projects facilitated the recruitment of participants, it should be noted that project partners – other than those listed in the acknowledgements (p. vii) – and the European Commission had no role in the experimental design, analysis or writing of either of these studies. Studies 2 and 7 were designed with the sole purpose of answering the overarching research question of this thesis. Full disclosure of interests together with a list of publications and conference presentations that received funding directly from this projects can be found on page v.

Undoubtedly, an involvement in large scale projects such as these can be beneficial, both for the research study itself – such as, through the collaborative input of other academics and research institutions – as well as providing an opportunity for personal development to the researcher. My involvement in the PlantLIBRA and CLYMBOL projects afforded me with an excellent learning opportunity to develop not only my academic skills, but also those associated with large-scale project management and organisation.

9.9 Future Research

The data within this thesis suggest that images offer many advantages to consumers and retailers – ease of processing, visual appeal, memorability, and so forth (Winkielman, Schwarz, Reber, & Fazendeiro, 2003) – but there is clearly much to learn about the diverse health inferences that specific images elicit – explicitly and implicitly – about the potency of images relative to written claims. For instance, one area that may warrant further investigation is the enduring nature of inferences. The design of the memory-based paradigm as it appears in this thesis required participants to perform a recognition, or free recall, task soon after viewing the product packaging. While this suggests that inferences are formed, at the point of, or soon after, viewing imagery, it does not tell us anything as to the potential duration of these inferences. Do such inferences remain stable over time? Would, for example, participants persist with the same memory errors if they were retested, say,
one-day, one-week, or one-month, after viewing the initial imagery? And how does the endurance of inferences formed from visual information compare with those formed from more explicit text-based messages? These questions are all the more important given the repeat nature of consumer behaviour.

Another area that may warrant further investigation relates to the relationship between consumer inferences and consumer behaviour. Particularly, given the assumption that consumer attitudes and beliefs are likely an important precondition to consumer purchasing and consumption behaviours. The research studies in this thesis focused on investigating the possible mechanisms underlying consumer decision-making, they therefore give little direct evidence as to the influence of such inferences on actual consumer behaviour, such as the purchasing of products and consumption. Further research is therefore needed to investigate this relationship and real-world consumer behaviour.
9.10 Conclusion

So, what do consumers infer about the health benefits of a breakfast cereal, whose packaging pictures it inside a heart shaped bowl? Or about a new dietary supplement, whose packaging bears a symbol of a human brain? The data presented in this thesis – derived through both direct and indirect measures -suggest that packaging imagery, such as this, could alter people’s beliefs as to the potential health benefits of consuming a product, insofar as they prime people’s expectations as to the product’s health function. In this respect, images are acting as health claims in a similar way to written claims. Furthermore, the data suggest that these inferences occur without prompting. That is to say, the health inferences generated when people view images on product packaging, often appear to be implicit and outside of consumers’ awareness. This spontaneity of inferences taken together with the found persistence of participants’ recognition errors implies that function imagery, such as heart-shaped cereal bowls and symbols of a human brain could have a subtle yet pervasive effect on consumers’ cognition. Thus the data presented here underscore the importance of regulating imagery on product packaging, and further suggest that an indirect memory-based measure, such as that presented here, may be an innovative way to measure the leading (or misleading) capacity of specific images.
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CONSENT FORM

*Investigating the influence of ‘health images’ on beliefs about ‘health claims’*

- I the undersigned voluntarily agree to take part in this study.

- I confirm that I am aged 18 years or over.

- I have read and understood the information sheet provided. I have been given a full explanation by the researcher as to the nature, purpose, location and likely duration of this study, and of what I will be expected to do. I have been given the opportunity to ask questions on all aspects of this study and have understood the advice and information given as a result.

- I understand that this study involves me undertaking a computer-based task, and as a result, the information I provide will be stored electronically. I understand that this information will be stored securely and confidentially, as outlined in the accompanying information sheet, and in accordance with the Data Protection Act (1998).

- I consent to my personal data, as outlined in the accompanying information sheet being used for this study and other research. I understand that all personal data relating to volunteers is held and processed in the strictest confidence, and in accordance with the Data Protection Act (1998).

- I understand that I am free to withdraw from the study at any time without needing to justify my decision and without prejudice.

- I acknowledge that, if I am a Year 1 or Year 2 undergraduate in the School of Psychology, then I will receive 1 lab token for my participation in this study. I recognise that if I withdraw from this study before completion I will no longer be eligible for the lab token. If I am not one of these groups, then my participation will not be compensated.

- I confirm that I have read and understood the above and freely consent to participating in this study. I have been given adequate time to consider my participation and agree to comply with the instructions and restrictions of the study.

Name of Volunteer (BLOCK CAPITALS): ............................................................

SIGNED: .............................................. DATE: ..............................................

Name of Researcher (BLOCK CAPITALS):... NAOMI KLEPACZ.........................................

SIGNED: .............................................. DATE: ..............................................

You are most welcome to contact the researcher on her email N.Klepacz@surrey.ac.uk or by telephone on 01483 689446. Naomi Klepacz is based in the School of Psychology, University of Surrey, Guildford, Surrey. GU2 7XH.
Thank you very much for taking part in this study!

Plant food supplements are generally well accepted by consumers as they potentially offer significant health benefits safely and at a relatively low cost. They are easily available and can be bought in most highstreet chemists and supermarkets, as well as more specialist health food stores. But how do we decided whether to buy/consume a particular plant food supplement?

When selecting whether to purchase a product, such as a plant food supplement, consumers go through a number of conscious and unconscious processes. For example, they may weigh up the likely benefits of taking such a product based either on their pre-existing knowledge or by gathering new knowledge, such as by studying the health claims associated with a particular product. One useful source of information is the product’s packaging. Here additional knowledge can be gained not only by reading any information on the label, but also looking at the pictures and symbols displayed on the packaging. This study is interested in the effect that these pictures and symbols have on the consumer.

The aim of this study was to investigate whether the images presented on the product packaging influence people’s belief in the accuracy of this information. We hypothesise that health claims that match the imagery presented on the packaging (e.g., a health claim about a healthy heart is shown with a package carrying an image of a heart) are more likely to be rated as true. This is because the viewer does not need to draw on previous knowledge or weigh up the pros and cons – the information they require to form a decision is in front of them. The presence of the image on the packaging reinforces the viewer’s assumption that the information must be genuine. Your participation will allow us to see how the design of plant food supplement packaging influences the consumers decision making process.

Please note that all the Plant Food Supplements seen during this study are fictitious and designed for experimental purposes only.

If you are interested in receiving information about the study’s findings once it is competed, please email the principal investigator, Naomi Klepacz on n.klepacz@surrey.ac.uk.

This study has received a favourable ethical opinion from the University of Surrey Ethics Committee – EC/2012/105/FAHS.

Once again, thank you for your participation!
Appendix C1. Critical health claims used in Study 1.

<table>
<thead>
<tr>
<th>Product Health Category</th>
<th>Critical Claims</th>
</tr>
</thead>
</table>
| Women’s Health           | This product helps to maintain a normal hormonal balance.  
                            | This product provides natural support for women.  
                            | This product helps maintain your hormonal balance throughout your monthly cycle.  
                            | This product promotes general health and well-being in women. |
| Memory and Cognitive Function | This product helps maintain short-term memory, concentration and cognitive function.  
                              | This product helps to maintain normal blood flow to the brain.  
                              | This product helps support mental performance.  
                              | This product contains a natural blend of herbs to aid restful sleep. |
| Sleep                    | This product offers relief from sleep disturbances.  
                            | This product is a traditional herbal remedy to promote natural sleep.  
                            | This product helps you to enjoy a natural night’s sleep.  
                            | This product contains a natural blend of herbs to aid restful sleep. |
| Bones and Joints         | This product helps you to maintain healthy and flexible joints.  
                            | This product helps you to maintain joint mobility.  
                            | This product helps your body maintain normal, healthy joints  
                            | This product helps care for your joints and joint tissue. |
| Heart Function           | This product helps to keep your heart healthy.  
                            | This product helps you to maintain a healthy level of cholesterol.  
                            | This product is scientifically proven to lower cholesterol levels.  
                            | This product helps you to maintain a normal blood pressure. |
| Cold and Flu             | This product is a traditional herbal medicine used to relieve cold symptoms.  
                            | This product helps protect against winter colds and flu.  
                            | This product is used in the treatment of colds and flu.  
                            | This product will help reduce the symptoms associated with a common cold and influenza. |
Appendix C2. Non-critical health claims used in Study 1.

<table>
<thead>
<tr>
<th>Non-Critical Claims</th>
</tr>
</thead>
<tbody>
<tr>
<td>This product helps to support normal immune function.</td>
</tr>
<tr>
<td>This product is a traditional herbal remedy that provides calming support and reduces stress.</td>
</tr>
<tr>
<td>This product is specifically formulated to provide nutritional support to those aged 50+</td>
</tr>
<tr>
<td>This product contains ‘friendly’ bacteria, which help to maintain a healthy gut.</td>
</tr>
<tr>
<td>This product helps to support the development of your unborn baby.</td>
</tr>
<tr>
<td>This product helps maintain physical health in the elderly.</td>
</tr>
<tr>
<td>This product contains nutrients that are essential in promoting general health and well-being.</td>
</tr>
<tr>
<td>This product is a traditional herbal medicine used to relieve the symptoms of mild anxiety.</td>
</tr>
<tr>
<td>This product has been specifically formulated to provide nutritional support to men aged 18-40 years.</td>
</tr>
<tr>
<td>This product contains essential nutrients that supplement your normal diet.</td>
</tr>
<tr>
<td>This product helps to maintain reproductive health in males.</td>
</tr>
<tr>
<td>This product is a natural source of pain relief.</td>
</tr>
<tr>
<td>This product helps to improve the appearance of hair, skin and nails.</td>
</tr>
<tr>
<td>This product is an important source of antioxidants.</td>
</tr>
<tr>
<td>This product is made from 100% natural plant extracts.</td>
</tr>
<tr>
<td>This product is scientifically proven to gradually build and sustain energy levels.</td>
</tr>
<tr>
<td>This product has contains beneficial vitamins and minerals to help maintain a healthy pregnancy.</td>
</tr>
<tr>
<td>This product has been scientifically formulated to help maintain eye health and normal vision.</td>
</tr>
<tr>
<td>This product helps to maintain normal bladder and urinary function.</td>
</tr>
<tr>
<td>This product helps protect against the damaging effects of free radicals.</td>
</tr>
<tr>
<td>This product contains nutrients essential for general well-being.</td>
</tr>
<tr>
<td>This product helps to support a normal nutritional balance.</td>
</tr>
<tr>
<td>This product helps to maintain physical health in growing children.</td>
</tr>
<tr>
<td>This product is specifically formulated for those training to excel in sports and fitness.</td>
</tr>
</tbody>
</table>
Miss Naomi Kiepacz  
School of Psychology  
FAHS  
31 October 2012  

Dear Miss Kiepacz  

Investigating the effects of health related graphics on people beliefs about the health claims of Plant Food Supplements EC/2012/105/FAHS  

On behalf of the Ethics Committee, I am pleased to confirm a favourable ethical opinion for the above research on the basis described in the submitted protocol and supporting documentation.  

Date of confirmation of ethical opinion: 31 October 2012.  

The final list of documents reviewed by the Committee is as follows:  

<table>
<thead>
<tr>
<th>Document</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summary of the project</td>
</tr>
<tr>
<td>Detailed protocol for the project</td>
</tr>
<tr>
<td>Information sheets for participants</td>
</tr>
<tr>
<td>Consent forms</td>
</tr>
<tr>
<td>Participant debriefing sheets</td>
</tr>
<tr>
<td>Recruitment advert to be placed on Sona Systems</td>
</tr>
</tbody>
</table>

This opinion is given on the understanding that you will comply with the University’s Ethical Guidelines for Teaching and Research. If the project includes distribution of a survey or questionnaire to members of the University community, researchers are asked to include a statement advising that the project has been reviewed by the University’s Ethics Committee.  

If you wish to make any amendments to your protocol please address your request to the Secretary of the Ethics Committee and attach any revised documentation.  

The Committee will need to be notified of adverse reactions suffered by research participants, and if the study is terminated earlier than expected with reasons. Please be advised that the Ethics Committee is able to audit research to ensure that researchers are abiding by the University requirements and guidelines.  

You are asked to note that a further submission to the Ethics Committee will be required in the event that the study is not completed within five years of the above date.  

Please inform me when the research has been completed.  

Yours sincerely,  

Alison Cummings  
Secretary, University Ethics Committee  
Academic Registry
Appendix E. Written health claims used in study 2.

<table>
<thead>
<tr>
<th>Written Health Claims</th>
</tr>
</thead>
<tbody>
<tr>
<td>This product aids in the maintenance of a healthy heart.</td>
</tr>
<tr>
<td>This product supports weight loss.</td>
</tr>
<tr>
<td>This product helps improve memory.</td>
</tr>
<tr>
<td>This product aids in the maintenance of healthy joints and muscles.</td>
</tr>
<tr>
<td>This product improves bowel function.</td>
</tr>
<tr>
<td>This product aids sleep and promotes restfulness.</td>
</tr>
<tr>
<td>This product relieves the symptoms associated with colds and flu.</td>
</tr>
<tr>
<td>This product relieves the symptoms of low mood and anxiety.</td>
</tr>
</tbody>
</table>
Appendix F. Risk and benefit claims used in study 2.

**Health Category:** Weight loss  
**Dietary Supplement:** Camellia Sinensis (Green Tea)

<table>
<thead>
<tr>
<th>Benefit</th>
<th>Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contributes to fat oxidation(^1)</td>
<td>Cases of liver damage have been reported(^1)</td>
</tr>
<tr>
<td>Helps to reduce the appetite(^1)</td>
<td>May cause sleep disturbances(^2)</td>
</tr>
</tbody>
</table>

\(^1\)EFSA (2010) Scientific Opinion on the substantiation of health claims related to Camellia sinensis(L.) Kuntze (tea), including catechins from green tea, and contribution to the maintenance of achievement of a normal body weight (ID 1107.1112, 1544, 2716), increased beta-oxidation of fatty acids leading to a reduction in body fat mass (ID 1123, 1124, 3698), and maintenance of normal blood glucose concentrations (ID 1115, 1545) pursuant to Article 13(1) of Regulation (EC) No 1924/2006. EFSA Journal; 8(10):1791,[22 pp.] doi:10.2903/j.efsa.2010.1791.

\(^2\)EMA(2013) Community herbal monograph on Camellia sinensis (L.) Kuntze, no fermentatum folium  
EMAHMPC/283630/2012.

**Health Category:** Heart Function  
**Dietary Supplement:** Allium Sativum (Garlic)

<table>
<thead>
<tr>
<th>Benefit</th>
<th>Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>May slow down the development of atherosclerosis(^1)</td>
<td>Can irritate the gastrointestinal (GI) tract(^1)</td>
</tr>
<tr>
<td>May slightly lower blood pressure(^2)</td>
<td>May slow blood clotting(^1)</td>
</tr>
</tbody>
</table>


**Health Category:** Memory & Cognitive Function  
**Dietary Supplement:** Ginkgo biloba (Ginkgo leaf)

<table>
<thead>
<tr>
<th>Benefit</th>
<th>Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>For the improvement of cognitive impairment(^1)</td>
<td>Headaches and dizziness(^1)</td>
</tr>
<tr>
<td>Might help improving memory(^2)</td>
<td>Allergic skin reactions, oedema, itching and rash(^1)</td>
</tr>
</tbody>
</table>


**Health Category:** Joints & Muscles  
**Dietary Supplement:** Harpagophytum procumbens (Devil’s claw)

<table>
<thead>
<tr>
<th>Benefits</th>
<th>Risks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Might help maintaining normal joints and muscles.¹</td>
<td>Gastrointestinal disorders; diarrhoea, nausea, vomiting, abdominal pain.²</td>
</tr>
<tr>
<td>Decreasing pain from Osteoarthritis.²</td>
<td>Can affect heart rate.²</td>
</tr>
</tbody>
</table>


**Health Category:** Bowel Function  
**Dietary Supplement:** Cassia angustifolia (Alexandrian Senna)

<table>
<thead>
<tr>
<th>Benefits</th>
<th>Risks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purification of blood¹</td>
<td>Electrolyte disturbances³</td>
</tr>
<tr>
<td>Improves bowel function²</td>
<td>Possibility of a carcinogenic risk of long-term use¹</td>
</tr>
</tbody>
</table>


² Scientific Opinion on the substantiation of a health claim related to hydroxyanthracene derivatives and improvement of bowel function pursuant to Article 13(5) of Regulation (EC) No 1924/2006.


**Health Category:** Cold & Flu  
**Dietary Supplement:** Echinaceae purpureae herba (Echinacea)

<table>
<thead>
<tr>
<th>Benefits</th>
<th>Risks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Used to fight infections, especially the common cold¹</td>
<td>Don’t take if you have an autoimmune disorder³.</td>
</tr>
<tr>
<td>Supports the immune system and the body’s defence²</td>
<td>Possibility of allergic reactions¹.</td>
</tr>
</tbody>
</table>


³EFSA(2010). Scientific Opinion on the substantiation of health claims related to various food(s)/food constituent(s) and “immune function/immune system” (ID 433, 605, 645, 791, 1384, 1451, 1624, 1743, 1776, 1838, 1851, 1854, 1891, 1895, 3074, 3191, 3211, 3218, 3316, 3341, 3450, 3514, 3658, 3756, 3802, 3805, 3841, 3935, 3979), “contribution to body defences against external agents” (ID 2344, 3208, 3213, 3270, 3278, 3285, 3294, 3309, 3387, 3424, 3428, 3556, 3537, 3539, 3575, 3577, 3579, 3582, 3603, 3618, 3755, 3776, 3777, 3778, 3801, 3804, 3840, 4367, 4472), reduction of inflammation (ID 1327, 1391) and decreasing potentially pathogenic gastro-intestinal microorganisms (ID 2362, 2730, 4064) pursuant to Article 13(1) of Regulation (EC) No 1924/2006.

17 March 2014

Dear Miss Klepacz,

Investigating the effects of health related graphics on people beliefs about the health claims of Plant Food Supplements EC/2012/185/FAHS Amendment.

I am writing to inform you that the Chairman, on behalf of the Ethics Committee, has considered the Amendments requested to the above protocol and has approved them on the understanding that the Ethical Guidelines for Teaching and Research are observed. Please be advised that the Ethics Committee is able to audit research to ensure that researchers are abiding by the University requirements and guidelines.

If the project includes distribution of a survey or questionnaire to members of the University community, researchers are asked to include a statement advising that the project has been reviewed by the University’s Ethics Committee.

Date of confirmation of ethical opinion: 31 October 2012.

Date of favourable ethical opinion of amendment to protocol: 17 March 2014.

The list of amended documents reviewed and approved by the Chairman is as follows:

<table>
<thead>
<tr>
<th>Document</th>
<th>Version</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cover letter with rationale</td>
<td></td>
<td>11 Mar 2014</td>
</tr>
<tr>
<td>Revised Protocol (amendment)</td>
<td></td>
<td>11 Mar 2014</td>
</tr>
<tr>
<td>Revised Participant Information</td>
<td></td>
<td>11 Mar 2014</td>
</tr>
<tr>
<td>Revised Consent Form</td>
<td></td>
<td>11 Mar 2014</td>
</tr>
<tr>
<td>Revised Debrief Statement &amp; Participant Information</td>
<td></td>
<td>11 Mar 2014</td>
</tr>
</tbody>
</table>

Yours sincerely,

Ms Susan Douthwaite
Secretary, University Ethics Committee
Please answer the following questions:

Are you viewing this survey on an ipad, tablet, mobile phone or other similar device?
- Yes
- No

Do you speak either Dutch or German?
- Yes
- No

Are you?
- Male
- Female

Please indicate your age:
- Younger than 18 years
- 18-29 years
- 30-39 years
- 40-49 years
- 50-64 years
- 65 years and over

PlantLIBRA - Studying the use of Plant Food Supplement

Thank-you for expressing an interest in participating in this research study. This research study is run by the University of Surrey's food, consumer behaviour & health research centre and is part of a European wide project called PlantLIBRA. This research aims to study consumer understanding of plant food supplements and their uses.

If you wish to take part you will be required to complete a task that will involve you looking at some plant food supplement products and reading some information about them. You will then be required to answer some questions about the information you have seen. You will also be asked to complete a short questionnaire on your health and use of plant food supplements.

Participation in the research is voluntary. You will be free to stop the survey and withdraw from this research study at any point by simply closing your browser window; completion of the survey will be taken as consent to participate. You will also be able to withdraw from the survey after completion by contacting the principal researcher, whose details are given below.

We anticipate that this study will take approximately 15 minutes to complete. All information that you provide will be anonymous and treated in strictest confidence. Data will be stored securely for ten years and handled in accordance with the European Directive 95/46/EC. Your name will not be used in any reports or publications that may arise from the study. If you have any questions concerning your participation, please feel free to contact the lead researcher Naomi Klepacz via her email n.klepacz@surrey.ac.uk, or Prof. Monique Raats via her email M.Raats@surrey.ac.uk. This study has been reviewed and received a favourable opinion from the University of Surrey Ethics Committee.

If you wish to participate, please press the Next button which will direct you to a consent form.
Consent Form

If you wish to take part in this study, please read the information below. If you do not wish to take part in this study, please close your browser window now.

☐ I have read and understood the information on the previous page and have been given a full explanation of the nature, purpose and likely duration of this study.

☐ I understand that this study involves me undertaking a computer-based task, and as a result, the information I provide will be stored electronically. I understand that this information will be stored securely and confidentially, and in accordance with European Directive 95/46/EC.

☐ I understand that all personal data relating to my participation in this study is held and processed in the strictest confidence, and in accordance with European Directive 95/46/EC.

☐ I understand that I am free to withdraw from this study at any time, without the need to justify my decision and without prejudice. I can do this by simply closing my browser window.

☐ I confirm that I have read and understood the above information and voluntarily agree to take part in this study.

The packaging below is for a fictional health supplement. Please look carefully at the packaging, and then answer the following questions.

Based on the packaging shown above, what do you think this product might be used for?

1.) This product relieves symptoms associated with colds and flu.

<table>
<thead>
<tr>
<th>Likely</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very unlikely</td>
<td></td>
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</tbody>
</table>

2.) This product aids in the maintenance of a healthy heart.

<table>
<thead>
<tr>
<th>Likely</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very unlikely</td>
<td></td>
<td></td>
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<tr>
<td>Very likely</td>
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</tbody>
</table>

3.) This product supports weight loss.

<table>
<thead>
<tr>
<th>Likely</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very unlikely</td>
<td></td>
<td></td>
<td></td>
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<td>Very likely</td>
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</tr>
</tbody>
</table>

4.) This product helps improve memory.

<table>
<thead>
<tr>
<th>Likely</th>
<th>1</th>
<th>2</th>
<th>3</th>
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<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very unlikely</td>
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<tr>
<td>Very likely</td>
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</tbody>
</table>

5.) This product aids in the maintenance of healthy joints and muscles

<table>
<thead>
<tr>
<th>Likely</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very unlikely</td>
<td></td>
<td></td>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Very likely</td>
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<td></td>
</tr>
</tbody>
</table>

6.) This product aids sleep and promotes restfulness.

<table>
<thead>
<tr>
<th>Likely</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very unlikely</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Very likely</td>
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</tr>
</tbody>
</table>

7.) This product improves bowel function.

<table>
<thead>
<tr>
<th>Likely</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very unlikely</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Very likely</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

8.) This product relieves the symptoms of low mood and mild anxiety.

<table>
<thead>
<tr>
<th>Likely</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very unlikely</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Very likely</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Here is some more information about the product you just saw.

This product aids in the maintenance of a healthy heart.

On the scale below, rate the degree to which you believe that somebody with this particular health complaint might benefit from taking this product.

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Definitely will benefit</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Definitively will benefit</td>
</tr>
</tbody>
</table>

On the scale below, rate the degree to which you believe that somebody with this particular health complaint might be at risk from taking this product.

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Definitely at risk</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Definitely not at risk</td>
</tr>
</tbody>
</table>

On the scale below, rate the degree to which you think the benefits of taking this product might outweigh the risks.

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>The risks outweigh the benefits</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>The benefits outweigh the risks</td>
</tr>
</tbody>
</table>

The packaging below is for a fictional health supplement. Please look carefully at the packaging, and then answer the following questions.

Based on the packaging shown above, what do you think this product might be used for?

1.) This product relieves symptoms associated with colds and flu.

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Very unlikely</td>
<td></td>
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2.) This product aids in the maintenance of a healthy heart.

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3.) This product supports weight loss.

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4.) This product helps improve memory.

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5.) This product aids in the maintenance of healthy joints and muscles

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6.) This product aids sleep and promotes restfulness.

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7.) This product improves bowel function.

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8.) This product relieves the symptoms of low mood and mild anxiety.

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Here is some more information about the product you just saw.

![Nitocris 60 Nutritional Supplement](image)

**This product supports weight loss.**

On the scale below, rate the degree to which you believe that somebody with this particular health complaint might **benefit** from taking this product.

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<th>9</th>
<th>10</th>
<th>Definitely will not benefit</th>
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</tr>
</thead>
</table>

On the scale below, rate the degree to which you believe that somebody with this particular health complaint might be at **risk** from taking this product.

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<th>Definitely at risk</th>
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</tr>
</thead>
</table>

On the scale below, rate the degree to which you think the benefits of taking this product might outweigh the risks.

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<tr>
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<th>1</th>
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The packaging below is for a fictional health supplement. Please look carefully at the packaging, and then answer the following questions.

![Product packaging](image)

Based on the packaging shown above, what do you think this product might be used for?

1. This product relieves symptoms associated with colds and flu.

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2. This product aids in the maintenance of a healthy heart.

<table>
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5. This product aids in the maintenance of healthy joints and muscles.

<table>
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6. This product aids sleep and promotes restfulness.

<table>
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<table>
<thead>
<tr>
<th>Benefits</th>
<th>Risks</th>
</tr>
</thead>
<tbody>
<tr>
<td>For the improvement of cognitive impairment.</td>
<td>Headaches and dizziness.</td>
</tr>
<tr>
<td>Might help improving memory.</td>
<td>Allergic skin reactions, oedema, itching and rash.</td>
</tr>
</tbody>
</table>

This product helps improve memory.

On the scale below, rate the degree to which you believe that somebody with this particular health complaint might **benefit** from taking this product.

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On the scale below, rate the degree to which you believe that somebody with this particular health complaint might be at **risk** from taking this product.

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This product aids in the maintenance of healthy joints and muscles.

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On the scale below. Rate the degree to which you believe that somebody with this particular health complaint might **BENEFIT** from taking this product.

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</tr>
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<tbody>
<tr>
<td>Definitely will not benefit</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Definitely will benefit</td>
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</tbody>
</table>

On the scale below. Rate the degree to which you believe that somebody with this particular health complaint might be at **RISK** from taking this product.

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<td></td>
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<td></td>
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<td>Definitely not at risk</td>
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On the scale below. Rate the degree to which you think the benefits of taking this product might outweigh the risks.

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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>The benefits outweigh the risks</td>
</tr>
</tbody>
</table>

The packaging below is for a fictional health supplement. Please look carefully at the packaging, and then answer the following questions.

Based on the packaging shown above, what do you think this product might be used for?

1.) This product relieves symptoms associated with colds and flu.

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
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<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very unlikely</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Very likely</td>
</tr>
</tbody>
</table>

2.) This product aids in the maintenance of a healthy heart.

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very unlikely</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Very likely</td>
</tr>
</tbody>
</table>

3.) This product supports weight loss.

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very unlikely</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Very likely</td>
</tr>
</tbody>
</table>

4.) This product helps improve memory.

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very unlikely</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Very likely</td>
</tr>
</tbody>
</table>

5.) This product aids in the maintenance of healthy joints and muscles.

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very unlikely</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Very likely</td>
</tr>
</tbody>
</table>

6.) This product aids sleep and promotes restfulness.

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
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<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very unlikely</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Very likely</td>
</tr>
</tbody>
</table>

7.) This product improves bowel function.

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
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<th>7</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Very unlikely</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Very likely</td>
</tr>
</tbody>
</table>

8.) This product relieves the symptoms of low mood and mild anxiety.

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
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<th>7</th>
<th>8</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Very unlikely</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Very likely</td>
</tr>
</tbody>
</table>
This product improves bowel function.

On the scale below. Rate the degree to which you believe that somebody with this particular health complaint might **benefit** from taking this product.

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
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<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Definitely will not benefit</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Definitely will benefit</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
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</tr>
</tbody>
</table>

On the scale below. Rate the degree to which you believe that somebody with this particular health complaint might be at **risk** from taking this product.

<table>
<thead>
<tr>
<th></th>
<th>1</th>
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<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Definitely at risk</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Definitely not at risk</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
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</tr>
</tbody>
</table>

On the scale below. Rate the degree to which you think the benefits of taking this product might outweigh the risks.

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
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<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>The risks outweigh the benefits</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>The benefits outweigh the risks</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Think about all the product packaging you have just viewed. Please list any additional information you would have liked to have seen on the product packaging to help you make your decisions in the previous task.

We are interested in how you made your decisions about the products you saw. Please describe how you made your ratings for the products. For example which, if any, of the information on the screen did you consider? Did anything other than the information on the screen help you decide?

Finally, some questions about you…

Plant food supplements are a type of dietary supplement that are made from plants. They can be in the form of tablets, capsules, powders or drops. Some examples of plant food supplements that are commonly taken are; Echinacea, evening primrose, Ginseng and Ginkgo. Herbs and spices used in cooking are not plant food supplements.

Do you take or have you ever taken Plant Food Supplements?

- Yes
- No

Please could you write the name of the plant, product (and if possible brand) as well as the reason you are taking/have taken it. If you cannot remember exactly just tell us what you can about the product and why you are/were taking it. If
you are unsure whether the supplement you are taking is a plant food supplement, please write it down anyway.

Age ______

Gender
☑ Male
☑ Female

What is the highest level of education you completed?
☑ Primary school
☑ Secondary school to age 15/16 years
☑ Secondary school to age 17/18 years
☑ College or vocational qualification
☑ University (undergraduate)
☑ University (Postgraduate)

What is your current employment status?
☑ Unemployed
☑ Employed
☑ Self-employed / freelance
☑ Homemaker
☑ Student
☑ Retired
☑ Unable to work

If you are currently employed, which of the following best describes your occupation?
☑ Higher managerial, administrative and professional
☑ Intermediate managerial, administrate and professional
☑ Supervisory, clerical and junior managerial, administrate and professional
☑ Skilled manual worker
☑ Semi-skiller manual worker
☑ Unskilled manual worker
Thank you for participating in this research study.

The research you have just undertaken forms part of the PlantLIBRA project. This is an EU project that aims to investigate consumer understanding of plant food supplements and their uses.

This research study aimed to examine whether packaging imagery affects people’s beliefs in the function of the product; and whether packaging imagery influences people’s perceptions of the potential risks and benefits associated with the product. Previous research has shown that people use packaging images (e.g., a picture of a heart) to help them make a decision about the potential health properties of the product (e.g., “This is good for my heart”). We predict that people undertaking this research study will use the packaging imagery in a similar way. Furthermore, we predict that when an image is clearly visible on the product packaging, people will rate this product as having more benefits and less risk, compared with products that don’t carry an image.

Please remember that all the product labels used in this study are fictitious and designed for experimental purposes only.

This research was conducted by the School of Psychology, University of Surrey, Uk and the Food Consumer Behaviour and Health Research Centre, University of Surrey. If you have any questions concerning your participation, please contact Toluna in the first instance. You can however contact the lead researcher Naomi Klepacz via her email N.Klepacz@Surrey.ac.uk, or Prof. Monique Raats on her email m.raats@surrey.ac.uk.

Please click this finish button to submit your answers.
Food and Drink Packaging Study

Thank you for expressing an interest in taking part in this short survey conducted by researchers from the school of psychology at the University of Surrey. It should take you no more than 2 minutes to complete.

Instructions

The following page contains a picture of either a piece of food or a drink. You will need to remember this image, as you will be asked questions on it! Please look at it carefully – you have 20 seconds to remember this image – a countdown timer will indicate how much time you have remaining. When the 20 seconds are up, you will be told to move to the next page where you will be asked a few short questions about the picture.

If you are happy to take part in this survey, please read the following statement of consent then check the box below. A full explanation of our research will be given when you have completed the survey.

If you have any questions concerning your participation in this study you are welcome to contact either Naomi Klepacz on n.klepacz@surrey.ac.uk or Dr Robert Nash on r.nash@surrey.ac.uk.

Statement of Consent

I understand that my participation in this study will be anonymous and that all personal data relating to my participation in this study will be held and processed in the strictest confidence and in accordance with the Data Protection Act (1998). I also acknowledge that I am free to withdraw from this survey at any time, without the need to justify my decision and without prejudice. I can do this by simply closing my web browser window.

I have read the above statement and agree to take part in this survey?

☐ Yes
☐ No
Please answer the following questions relating to the product you have just seen.

1. The recommended daily intake of fat is 70g for a woman and 95g for a man. How many grams of fat do you estimate to be in the product you saw on the previous page?

________________________grams

2. The recommended daily intake of sugar is 90g for a woman and 120g for a man. How many grams of sugar do you estimate to be in the product you saw on the previous page?

________________________grams

3. The recommended daily calorie intake is 2,000kcal for a woman and 2,500kcal for a man. How many calories do you estimate to be in the product you saw on the previous page?

________________________kals

Example from the McChicken Sandwich Olympic Branding Present Condition

00:20
When your time is up, click on the arrow to continue
Which company, organisation or event does the following logo represent?

![Logo Image]

Write your answer here: __________________________________________

Was this logo present on the product that you viewed?

☐ Yes  ☐ No

Read the following statement then give your response on the scale below.

"Food and drinks that bear the logo of the Olympic Games are required to be nutritious and healthy."

<table>
<thead>
<tr>
<th>Completely disagree</th>
<th>Neither agree nor disagree</th>
<th>Completely agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Just a few questions about yourself – then you are done!

What gender are you?

☐ Male  ☐ Female

What is your age? _______ years

What is your highest level of education

☐ No formal qualifications  ☐ GCSEs/O-levels/NVQ/Equivalent
☐ A-Levels/Equivalent  ☐ Undergraduate Degree
☐ Postgraduate Degree

Are you a permanent UK resident?

☐ Yes  ☐ No

If no, please date your country of residence

What is your ethnic group? (optional)
Debrief Statement

Thank you very much for your help….

The aim of this study was to investigate what inferences people make about food and drink products that carry Olympic branding. To help us study this you may have seen a picture of a product carrying Olympic branding or you may have seen an unmarked item. Please note that none of the products featured in this study have endorsed this research. Finally, please do not complete this survey again, or disclosed its content to anyone else.

This study was designed by researchers from the school of Psychology at the University of Surrey. If you have any further questions about this survey please contact either Naomi Klepacz on n.klepacz@surrey.ac.uk or Dr Robert Nash on r.nash@surrey.ac.uk. If you have any concerns about this study please contact Prof Jane Ogden on j.ogden@surrey.ac.uk.

Thanks again for your participation
CONSENT FORM

Investigating the effect of ‘health images’ on the recognition of ‘health claims’.

I the undersigned voluntarily agree to take part in this study.

I confirm that I am aged 18 years or over.

I have read and understood the information sheet provided. I have been given a full explanation by the researcher as to the nature, purpose, location and likely duration of this study, and of what I will be expected to do. I have been given the opportunity to ask questions on all aspects of this study and have understood the advice and information given as a result.

I understand that this study involves me undertaking a computer-based task, and as a result, the information I provide will be stored electronically. I understand that this information will be stored securely and confidentially, as outlined in the accompanying information sheet, and in accordance with the Data Protection Act (1998).

I consent to my personal data, as outlined in the accompanying information sheet being used for this study and other research. I understand that all personal data relating to volunteers is held and processed in the strictest confidence, and in accordance with the Data Protection Act (1998).

I understand that I am free to withdraw from the study at any time without needing to justify my decision and without prejudice.

I acknowledge that, if I am a Year 1 or Year 2 undergraduate in the School of Psychology, then I will receive 1 lab token for my participation in this study. I recognise that if I withdraw from this study before completion I will no longer be eligible for the lab token. If I am not one of these groups, then my participation will not be compensated.

I confirm that I have read and understood the above and freely consent to participating in this study. I have been given adequate time to consider my participation and agree to comply with the instructions and restrictions of the study.

Name of Volunteer (BLOCK CAPITALS):…………………………………………………………

SIGNED: ………………………………………………… DATE: …………… URN:…………………

Please note that your URN is required if you wish to receive lab tokens for your participation.

Name of Researcher (BLOCK CAPITALS):…NAOMI KLEPACZ………………………………

SIGNED: …………………………………………………………… DATE: ……………

You are most welcome to contact the researcher on her email N.Klepacz@surrey.ac.uk or by telephone on 01483 689446.

Naomi Klepacz is based in the School of Psychology, University of Surrey, Guildford, Surrey. GU2 7XH.
Participant debriefing sheet

Investigating the effect of health images on the recognition of health claims.

Thank you very much for taking part in this study!

Plant food supplements are generally well accepted by consumers as they potentially offer significant health benefits safely and at a relatively low cost. They are easily available and can be brought in most highstreet chemists and supermarkets, as well as more specialist health food stores. But how do we decide whether to buy/consume a particular plant food supplement?

When selecting a product, such as a plant food supplement, consumers may perform a cost/benefit analysis. In this they weigh up the likely benefits of consuming such a product by studying the health claims associated with it. In the case of packaged products information as to its potential health benefits can be gained through viewing the various symbols, pictures and text presented on the products packaging.

We hypothesis that if a person had previous seen a Plant Food Supplement label with a picture of, for example, a heart on it then they would be more likely to falsely recognise health claims relating to heart function. This is because when you see an image, such as a heart, on the packaging of a Plant Food Supplement the you naturally expect that product to be beneficial to your heart. These expectations consistent with the recently activated schema will affect the retrieval of the health claims presented subsequently, and ultimately affect the recognition of this information. Thus you will become susceptible to creating a false memory of the health claims presented.

Please remember that all the Plant Food Supplements seen during this study are fictitious and designed for experimental purposes only. The health claims described were also invented, and thus have no bearing on the health properties of any existing product.

If you are interested in receiving information about the study’s findings once it is competed, please email the lead researcher, Naomi Klepacz on n.klepacz@surrey.ac.uk. This study has received a favourable ethical opinion from the University of Surrey Ethics Committee – EC/2012/105/FAHS.

Once again, thank you for your participation!

INFORMATION FOR SCHOOL OF PSYCHOLOGY LAB TOKEN SCHEME 2013-2014

Researcher’s Name: Naomi Klepacz Study Ethics Code: EC/2012/105/FAHS.
You will receive ________ lab token(s) for your participation in this study.
PARTICIPANT INSTRUCTIONS – PART ONE

In the first part of this experiment you will be shown some images of plant food supplement labels, underneath which will appear some statements. These statements will remain on the screen for a very short period of time. Please try and remember as much information as you can about both the image and statements. You will be asked about this information later.

You will be shown 6 labels and associated statements. In between each set you will be asked to complete some anagrams in your booklet. You will have one minute to complete as many of the anagrams as you can. Please don’t worry if you can’t complete all of them in the time.

PARTICIPANT INSTRUCTIONS – PART TWO

You will now be shown some more image/statement pairs. Some of these pairs you WILL have seen before and some you WILL NOT have previously seen. Your task is to identify which of these image/statement pairs you have seen previously during the first part of this experiment. You will be asked the question “Have you previously seen this image and statement pair?”

If the answer is yes, press ‘y’.
If the answer is no, press ‘n’.

If you identified that you saw the image and statement pair before you will be asked to:
    Press 1 if you REMEMBER specific details of seeing the statement on the screen.
    Press 2 if you KNOW you’ve seen the statement before, but can’t bring to mind any specific details about seeing it on the screen.
    Press 3 if you are just making a GUESS.

PRESS SPACE BAR TO CONTINUE
**Appendix M1.** Critical health claims used in study 4.

<table>
<thead>
<tr>
<th>Product Health Category</th>
<th>Critical Heath Claims</th>
</tr>
</thead>
<tbody>
<tr>
<td>Women’s Health</td>
<td>Provides natural support for women. Helps to maintain a normal hormonal balance.</td>
</tr>
<tr>
<td>Sleep</td>
<td>Offers relief from sleep disturbances. Helps you to enjoy a natural night’s sleep.</td>
</tr>
<tr>
<td>Bones &amp; Joints</td>
<td>Helps your body maintain normal, healthy joints. Helps your body maintain flexible joints.</td>
</tr>
<tr>
<td>Heart Function</td>
<td>Proven to Significantly lower cholesterol levels. Aids in the maintenance of a healthy heart.</td>
</tr>
<tr>
<td>Cold &amp; Flu</td>
<td>Traditional medicine used to relieve cold symptoms. Used in the treatment of colds and flu.</td>
</tr>
</tbody>
</table>
Appendix M2. Non-critical health claims used in study 4.

<table>
<thead>
<tr>
<th>Product Health Category</th>
<th>Non - Critical Health Claims</th>
</tr>
</thead>
<tbody>
<tr>
<td>Women’s Health</td>
<td>Hatshepsut now has added vitamins and minerals. A rich source of carotenoids. Larger size 90 capsule packets. Contains both Star Flower and Evening Primrose Oils.</td>
</tr>
<tr>
<td>Unrelated Health Claims</td>
<td>Formulated to maintain healthy eyes and vision. This herbal medicine helps maintain normal bladder function. Specifically formulated for men aged 18-40yrs. Supports physical health in growing children.</td>
</tr>
<tr>
<td>Sleep</td>
<td>Related Health Claims</td>
</tr>
<tr>
<td>Unrelated Health Claims</td>
<td>Used to relieve symptoms of anxiety. Contains bacteria to help maintain a healthy gut. Improves the appearance of hair, skin and nails. An important source of antioxidants.</td>
</tr>
<tr>
<td>Unrelated Health Claims</td>
<td>Contains vitamins beneficial to pregnancy. Helps to maintain a healthy urinary function. Provides a mental and physical energy lift. Provides a balanced intake of Omega – 3.</td>
</tr>
<tr>
<td>Heart Function</td>
<td>Related Health Claims</td>
</tr>
<tr>
<td>Unrelated Health Claims</td>
<td>Keeps your skin looking healthy and radiant. Formulated to meet the requirements of new mothers. To support your health during the winter months. Contains Thiamine to maintain a normal metabolism.</td>
</tr>
<tr>
<td>Cold &amp; Flu</td>
<td>Related Health Claims</td>
</tr>
<tr>
<td>Unrelated Health Claims</td>
<td>Contains nutrients essential for general well-being. Provides nutritional support for those aged 50 + Helps support the development of your unborn baby.</td>
</tr>
</tbody>
</table>
CONSENT FORM

A study into the effect of ‘health images’ on memory for ‘health claims’.

I the undersigned voluntarily agree to take part in this study.

I confirm that I am aged 18 years or over.

I have read and understood the information sheet provided. I have been given a full explanation by the researcher as to the nature, purpose, location and likely duration of this study, and of what I will be expected to do. I have been given the opportunity to ask questions on all aspects of this study and have understood the advice and information given as a result.

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I confirm that I have read and understood the above and freely consent to participating in this study. I have been given adequate time to consider my participation and agree to comply with the instructions and restrictions of the study.

Name of Volunteer (BLOCK CAPITALS):…………………………………………………………………

SIGNED: …………………………………………..DATE: …………….. URN:…………………………

Please note that your URN is required if you wish to receive lab tokens for your participation.

Name of Researcher (BLOCK CAPITALS):…NAOMI KLEPACZ……………………………………

SIGNED: ………………………………………………..DATE: ……………

You are most welcome to contact the researcher on her email N.Klepacz@surrey.ac.uk or by telephone on 01483 689446. Naomi Klepacz is based in the School of Psychology, University of Surrey, Guildford, Surrey. GU2 7XH. 
Participant debriefing sheet

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Plant food supplements are generally well accepted by consumers as they potentially offer significant health benefits safely and at a relatively low cost. They are easily available and can be bought in most highstreet chemists and supermarkets, as well as more specialist health food stores. But how do we decide whether to buy/consume a particular plant food supplement?

When selecting a product, such as a plant food supplement, consumers may perform a cost /benefit analysis. In this they weigh up the likely benefits of consuming such a product by studying the health claims associated with it. In the case of packaged products information as to its potential health benefits can be gained through viewing the various symbols, pictures and text presented on the products packaging.

We hypothesis that if a person had previous seen a Plant Food Supplement label with a picture of, for example, a heart on it then they would be more likely to falsely recognise health claims relating to heart function. This is because when you see an image, such as a heart, on the packaging of a Plant Food Supplement the you naturally expect that product to be beneficial to your heart. These expectations consistent with the recently activated schema will affect the retrieval of the health claims presented subsequently, and ultimately affect the recognition of this information. Thus you will become susceptible to creating a false memory of the health claims presented.

Please remember that all the Plant Food Supplements seen during this study are fictitious and designed for experimental purposes only. The health claims described were also invented, and thus have no bearing on the health properties of any existing product.

If you are interested in receiving information about the study’s findings once it is competed, please email the lead researcher, Naomi Klepacz on n.klepacz@surrey.ac.uk. This study has received a favourable ethical opinion from the University of Surrey Ethics Committee – EC/2012/105/FAHS.

Once again, thank you for your participation!

INFORMATION FOR SCHOOL OF PSYCHOLOGY LAB TOKEN SCHEME 2013-2014

Researcher’s Name: Naomi Klepacz  Study Ethics Code: EC/2012/105/FAHS.
You will receive _________ lab token(s) for your participation in this study.
PARTICIPANT INSTRUCTIONS – PART ONE

In the first part of this experiment you will be shown some images of plant food supplement labels, underneath which will appear some statements. These statements will remain on the screen for a very short period of time. Please try and remember as much information as you can about both the image and statements. You will be asked about this information later.

You will be shown 6 labels and associated statements. In between each set you will be asked to complete some anagrams in your booklet. You will have one minute to complete as many of the anagrams as you can. Please don’t worry if you can’t complete all of them in the time.

Some of the labels you will see have pictures or symbols on them. These pictures and symbols have been placed onto the labels entirely at random. Because of this randomness, the pictures and symbols you will see actually provide no information at all about the product’s real function.

PLEASE PRESS SPACE BAR TO CONTINUE

PARTICIPANT INSTRUCTIONS – PART TWO

You will now be shown some more image/statement pairs. Some of these pairs you WILL have seen before and some you WILL NOT have previously seen. Your task is to identify which of these image/statement pairs you have seen previously during the first part of this experiment. You will be asked the question “Have you previously seen this image and statement pair?”

If the answer is yes, press ‘y’.
If the answer is no, press ‘n’.

If you identified that you saw the image and statement pair before you will be asked to:
Press 1 if you REMEMBER specific details of seeing the statement on the screen.
Press 2 if you KNOW you’ve seen the statement before, but can’t bring to mind any specific details about seeing it on the screen.
Press 3 if you are just making a GUESS.

PRESS SPACE BAR TO CONTINUE
05 August 2013

Dear Miss Klepacz

Investigating the effects of health related graphics on people beliefs about the health claims of Plant Food Supplements EC/2012/105/FAHS

I am writing to inform you that the Chairman, on behalf of the Ethics Committee, has considered the Amendments requested to the above protocol and has approved them on the understanding that the Ethical Guidelines for Teaching and Research are observed. Please be advised that the Ethics Committee is able to audit research to ensure that researchers are abiding by the University requirements and guidelines.

If the project includes distribution of a survey or questionnaire to members of the University community, researchers are asked to include a statement advising that the project has been reviewed by the University's Ethics Committee.

Date of confirmation of ethical opinion: 31 October 2013.

Date of favourable ethical opinion of amendment to protocol: 5 August 2013

The list of amended documents reviewed and approved by the Chairman is as follows:-

<table>
<thead>
<tr>
<th>Document</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protocol Amendment for research project 29 July 13</td>
</tr>
<tr>
<td>Participant Information Sheet 29 July 13</td>
</tr>
<tr>
<td>Participant debriefing Sheet 29 July 13</td>
</tr>
<tr>
<td>Consent form 29 July 13</td>
</tr>
</tbody>
</table>

Yours sincerely,

Mike Chenery  
Secretary, University Ethics Committee
CONSENT FORM

A study into the effect of packaging imagery and text on people’s memory for ‘health claims’.

I the undersigned voluntarily agree to take part in this study.

- I confirm that I am aged 18 years or over.
- I have read and understood the information sheet provided. I have been given a full explanation by the researcher as to the nature, purpose, location and likely duration of this study, and of what I will be expected to do. I have been given the opportunity to ask questions on all aspects of this study and have understood the advice and information given as a result.
- I understand that this study involves me undertaking a computer-based task, and as a result, the information I provide will be stored electronically. I understand that this information will be stored securely and confidentially, as outlined in the accompanying information sheet, and in accordance with the Data Protection Act (1998).
- I consent to my personal data, as outlined in the accompanying information sheet being used for this study and other research. I understand that all personal data relating to volunteers is held and processed in the strictest confidence, and in accordance with the Data Protection Act (1998).
- I understand that I am free to withdraw from the study at any time without needing to justify my decision and without prejudice.
- I acknowledge that, if I am a Year 1 or Year 2 undergraduate in the School of Psychology, then I will receive 1 lab token for my participation in this study. I recognise that if I withdraw from this study before completion I will no longer be eligible for the lab token. If I am not one of these groups, then my participation will not be compensated.
- I confirm that I have read and understood the above and freely consent to participating in this study. I have been given adequate time to consider my participation and agree to comply with the instructions and restrictions of the study.

Name of Volunteer (BLOCK CAPITALS):……………………………………………………………..
SIGNED: ………………………………………….. DATE: …………… URN:…………………………
Please note that your URN is required if you wish to receive lab tokens for your participation.

Name of Researcher (BLOCK CAPITALS):…NAOMI KLEPACZ…………………………………
SIGNED: …………………………………………… DATE: …………….
You are most welcome to contact the researcher on her email N.Klepacz@surrey.ac.uk or by telephone on 01483 689446. Naomi Klepacz is based in the School of Psychology, University of Surrey, Guildford, Surrey. GU2 7XH.
Participant debriefing sheet

A study into the effect of packaging imagery and text on people’s memory for ‘health claims’.

Thank you very much for taking part in this study!

Plant food supplements are generally well accepted by consumers as they potentially offer significant health benefits safely and at a relatively low cost. They are easily available and can be brought in most highstreet chemists and supermarkets, as well as more specialist health food stores. But how do we decide whether to buy/consume a particular plant food supplement?

When selecting a product, such as a plant food supplement, consumers may perform a cost/benefit analysis. In this they weigh up the likely benefits of consuming such a product by studying the health claims associated with it. In the case of packaged products information as to its potential health benefits can be gained through viewing the various symbols, pictures and text presented on the products packaging.

We hypothesis that if a person had previous seen a Plant Food Supplement label with a picture of, for example, a heart on it then they would be more likely to falsely recognise health claims relating to heart function. This is because when you see an image, such as a heart, on the packaging of a Plant Food Supplement the you naturally expect that product to be beneficial to your heart. These expectations consistent with the recently activated schema will affect the retrieval of the health claims presented subsequently, and ultimately affect the recognition of this information. Thus you will become susceptible to creating a false memory of the health claims presented.

Please remember that all the Plant Food Supplements seen during this study are fictitious and designed for experimental purposes only. The health claims described were also invented, and thus have no bearing on the health properties of any existing product.

If you are interested in receiving information about the study’s findings once it is competed, please email the lead researcher, Naomi Klepacz on n.klepacz@surrey.ac.uk.

This study has received a favourable ethical opinion from the University of Surrey Ethics Committee – EC/2012/105/FAHS.

Once again, thank you for your participation!

___________________________________________________________

INFORMATION FOR SCHOOL OF PSYCHOLOGY LAB TOKEN SCHEME 2013-2014

Researcher’s Name: Naomi Klepacz
Study Ethics Code: EC/2012/105/FAHS.
You will receive ________ lab token(s) for your participation in this study.
Appendix T. Critical health claims used in Study 5.

<table>
<thead>
<tr>
<th>Health Category</th>
<th>Critical Health Claims</th>
</tr>
</thead>
<tbody>
<tr>
<td>Women’s health</td>
<td>Especially for women during their monthly cycle. Formulated to support a healthy hormone balance.</td>
</tr>
<tr>
<td>Memory &amp; Cognitive Function</td>
<td>Used to maintain the natural function of the brain. For memory, ability to concentrate, and mental performance.</td>
</tr>
<tr>
<td>Sleep</td>
<td>For the relief of temporary sleeplessness. Helps you enjoy a better night’s sleep.</td>
</tr>
<tr>
<td>Bones &amp; Joints</td>
<td>Provides a complete solution for joint health. Targeted support for joints and muscles.</td>
</tr>
<tr>
<td>Heart Function</td>
<td>May help to maintain a healthy heart. Helps to maintain a normal blood pressure.</td>
</tr>
<tr>
<td>Cold &amp; Flu</td>
<td>Defends against winter colds and flu. Targets nasal congestion and flu-like symptoms.</td>
</tr>
<tr>
<td>Weight management</td>
<td>Aids weight loss in conjunction with a healthy diet. A maximum strength aid for slimming.</td>
</tr>
<tr>
<td>Digestive function</td>
<td>Helps restore a natural digestive balance. Supports Natural intestinal transit.</td>
</tr>
</tbody>
</table>
Miss Nacmi N Klepacz  
School of Psychology  
FAHS

05 August 2013

Dear Miss Klepacz,

Investigating the effects of health related graphics on people beliefs about the health claims of Plant Food Supplements EC/2012/105/FAHS

I am writing to inform you that the Chairman, on behalf of the Ethics Committee, has considered the Amendments requested to the above protocol and has approved them on the understanding that the Ethical Guidelines for Teaching and Research are observed. Please be advised that the Ethics Committee is able to audit research to ensure that researchers are abiding by the University requirements and guidelines.

If the project includes distribution of a survey or questionnaire to members of the University community, researchers are asked to include a statement advising that the project has been reviewed by the University’s Ethics Committee.

Date of confirmation of ethical opinion: 31 October 2013.

Date of favourable ethical opinion of amendment to protocol: 5 August 2013

The list of amended ethical opinions of amendment to protocol is as follows:

<table>
<thead>
<tr>
<th>Document</th>
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<tbody>
<tr>
<td>Protocol Amendment for research project 29 July 13</td>
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</tr>
<tr>
<td>Consent form 29 July 13</td>
</tr>
</tbody>
</table>

Yours sincerely

Mike Chenery  
Secretary, University Ethics Committee
Appendix VI. Products’ representing the health category of ‘cold and flu’. Image (a) represents the function image-present x packaging claim congruent condition; image (b) represents the function image-present x packaging claim incongruent condition; image (c) represents the function image–absent x packaging claim congruent, and image (d) represents the function image-absent x packaging claim incongruent condition.
Appendix V2. Products’ representing the health category of ‘heart function’. Image (a) represents the function image-present x packaging claim congruent condition; image (b) represents the function image-present x packaging claim incongruent condition; image (c) represents the function image-absent x packaging claim congruent, and image (d) represents the function image-absent x packaging claim incongruent condition.
Appendix V. Products’ representing the health category of ‘bones & joints’. Image (a) represents the function image-present x packaging claim congruent condition; image (b) represents the function image-present x packaging claim incongruent condition; image (c) represents the function image-absent x packaging claim congruent, and image (d) represents the function image-absent x packaging claim incongruent condition.
Appendix V4. Products’ representing the health category of ‘memory & cognitive function’. Image (a) represents the function image-present x packaging claim congruent condition; image (b) represents the function image-present x packaging claim incongruent condition; image (c) represents the function image – absent x packaging claim congruent, and image (d) represents the function image-absent x packaging claim incongruent condition.
Appendix V5. Products' representing the health category of ‘sleep’. Image (a) represents the function image-present x packaging claim congruent condition; image (b) represents the function image-present x packaging claim incongruent condition; image (c) represents the function image-absent x packaging claim congruent, and image (d) represents the function image-absent x packaging claim incongruent condition.
Appendix V6. Products’ representing the health category of ‘weight loss’. Image (a) represents the function image-p reset x packaging claim congruent condition; image (b) represents the function image- present x packaging claim incongruent condition; image (c) represents the function image – absent x packaging claim congruent, and image (d) represents the function image-absent x packaging claim incongruent condition.
Appendix V7. Products’ representing the health category of ‘women’s health’. Image (a) represents the function image-present x packaging claim congruent condition; image (b) represents the function image-present x packaging claim incongruent condition; image (c) represents the function image-absent x packaging claim congruent, and image (d) represents the function image-absent x packaging claim incongruent condition.
**Consent Form**

If you wish to take part in this study, please read the information below. If you do not wish to take part in this study, please close your browser window now.

☐ I have read and understood the information on the previous page and have been given a full explanation of the nature, purpose and likely duration of this study.

☐ I understand that this study involves me undertaking a computer-based task, and as a result, the information I provide will be stored electronically. I understand that this information will be stored securely and confidentially, and in accordance with European Directive 95/46/EC.

☐ I understand that all the personal data relating to my participation in this study is held and processed in the strictest confidence, and in accordance with European Directive 95/46/EC.

☐ I understand that I am free to withdraw from this study at any time without the need to justify my decision and without prejudice. I can do this by simply closing my browser window.

☐ I confirm that I have read and understood the above information and voluntarily agree to take part in this study.
CLYMBOL: Investigating how food labelling influences consumer behaviour.

Thank-you for expressing an interest in participating in this research study. This research study is run by the University of Surrey, UK and is part of a European wide project called CLYMBOL. This project aims to investigate how food labelling influences consumer purchasing and consumption behaviour.

If you wish to take part you will be required to complete a task that will involve you looking at some food labels and completing some straightforward memory tasks relating to the information you were shown. You will also be asked to complete a short questionnaire on your health and choice of foods.

Participation in this research is voluntary. You will be free to stop the survey and withdraw from the study at any point by simply closing your browser window; completion of the survey will be taken as consent to participate. You will also be able to withdraw from the survey after completion by contacting the principal researcher, whose details are given below.

We anticipate that this study will take 30 minutes to complete. All information that you provide will be anonymous and treated in strictest confidence. Data will be stored securely for ten years and handled in accordance with the European Directive 95/46/EC. Your name will not be used in any reports or publications that may arise from the study.

If you have any questions concerning your participation, please feel free to contact the lead researcher Naomi Klepacz via her email N.Klepacz@surrey.ac.uk, or Prof. Monique Raats via her email m.raats@surrey.ac.uk. This study has been reviewed and received a favourable opinion from the University of Surrey Ethics Committee.

If you wish to participate, please press the Next button which will direct you to a consent form.
Thank-you for participating in this research study.

The research you have just undertaken forms part of the ‘CLYMBOL’ project. This is an EU project that aims to investigate the role of health claims and symbols, commonly found on food packaging, on consumer behaviour.

This research study aimed to look at the assumptions people make about the health benefits of a product when looking at its packaging. For example, people may assume that a product has greater health benefits than it actually does because they misunderstand the health claims and symbols provided on the packaging. We wanted to see what information people remembered about the health claims on the food packaging, and whether their memory for this information is affected by the addition of a health symbol on the packaging. We predict that people are more likely to misremember the product as claiming to have a greater benefit to their health when they saw both a health claim and a symbol on the packaging.

This research was conducted by the School of Psychology, University of Surrey, UK and the Food Consumer Behaviour and Health Research Centre, University of Surrey. If you have any questions concerning your participation, please contact Toluna in the first instance. You can however contact the lead researcher Naomi Klepacz via her email N.Klepacz@Surrey.ac.uk, or Prof. Monique Raats on her email M.Raats@Surrey.ac.uk
Appendix

Miss Naomi Klepac
School of Psychology
FAHS

11 November 2013

Dear Miss Klepac

CLYNBOL: Role of health related Claims and sYMBOLs in consumer behaviour
Task 2.1a (part 2) EC/2013/112/FAHS

On behalf of the Ethics Committee, I am pleased to confirm a favourable ethical opinion for the above research on the basis described in the submitted protocol and supporting documentation.

Date of confirmation of ethical opinion: 11 November 2013

The list of documents reviewed by the Committee is as follows:-

<table>
<thead>
<tr>
<th>Document</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summary of the project</td>
</tr>
<tr>
<td>Detailed protocol</td>
</tr>
<tr>
<td>Appendix 1: Pictures</td>
</tr>
<tr>
<td>Appendix 2: EU classification</td>
</tr>
<tr>
<td>Appendix 3: Participant Information Sheet</td>
</tr>
<tr>
<td>Appendix 4: Consent Form</td>
</tr>
<tr>
<td>Appendix 5: Participant Characteristics Questionnaire</td>
</tr>
<tr>
<td>Appendix 6: Debrief Statement</td>
</tr>
</tbody>
</table>

This opinion is given on the understanding that you will comply with the University’s Ethical Guidelines for Teaching and Research, and with the conditions set out as follows:

- Although the PIS mentions that data will be stored securely for 10 years, this should also be stated on the protocol and protocol cover sheet.

I would be grateful if you would confirm, in writing, your acceptance of the conditions above.

If the project includes distribution of a survey or questionnaire to members of the University community, researchers are asked to include a statement advising that the project has been reviewed by the University’s Ethics Committee.

If you wish to make any amendments to your protocol please address your request to the Secretary of the Ethics Committee and attach any revised documentation.

The Committee will need to be notified of any adverse reactions suffered by research participants, and if the study is terminated earlier than expected, with reasons. Please be advised that the Ethics Committee is able to audit research to ensure that researchers are abiding by the University requirements and guidelines.

You are asked to note that a further submission to the Ethics Committee will be required in the event that the study is not completed within five years of the above date.

Please inform me when the research has been completed.

Yours sincerely

Mike Chenery
Secretary, University Ethics Committee
Research & Enterprise Support
Appendix AA1. Examples of carrier packaging displaying text-based claims and a function image. Package example – wholegrain bread – with generic claims (panels a. and b.), nutrition claims (c. and d.), and health claims (e. and f.). Exemplars in the left column represent the image-absent condition; those in the right column the image-present condition. In this case the corresponding function image a silhouette of a torso with a downwards arrow representing digestive transit.
Appendix AA2. Examples of carrier packaging displaying text-based claims and a function image. Package example – cheddar cheese - with generic claims (panels a. and b.), nutrition claims (c. and d.), and health claims (e. and f.). Exemplars in the left column represent the image-absent condition; those in the right column the image-present condition. In this case the corresponding function image is a stretching human figure with bone illustration.
Appendix AA3. Examples of carrier packaging displaying text-based claims and a function image. Package example – peanuts - with generic claims (panels a. and b.), nutrition claims (c. and d.), and health claims (e. and f.). Exemplars in the left column represent the image-absent condition; those in the right column the image-present condition. In this case the corresponding function image is a profile of a human head displaying a circle with a ‘brain wave’ trace passing through it.
Appendix AA4. Examples of carrier packaging displaying text-based claims and a function image. Package example – fish fingers - with generic claims (panels a. and b.), nutrition claims (c. and d.), and health claims (e. and f.). Exemplars in the left column represent the image-absent condition; those in the right column the image-present condition. In this case the corresponding function image is a profile of a human head displaying a circle with a ‘brain wave’ trace passing through it.
Appendix AA5. Examples of carrier packaging displaying text-based claims and a function image. Package example – porridge oats - with generic claims (panels a. and b.), nutrition claims (c. and d.), and health claims (e. and f.). Exemplars in the left column represent the image-absent condition; those in the right column the image-present condition. In this case the corresponding function image is a three-quarter outline of a red heart.
Appendix AA6. Examples of carrier packaging displaying text-based claims and a function image. Package example – wholegrain pasta - with generic claims (panels a. and b.), nutrition claims (c. and d.), and health claims (e. and f.). Exemplars in the left column represent the image-absent condition; those in the right column the image-present condition. In this case the corresponding function image a silhouette of a torso with a downwards arrow representing digestive transit.
Appendix A47. Examples of carrier packaging displaying text-based claims and a function image. Package example – drinking yogurt (smoothie) - with generic claims (panels a. and b.), nutrition claims (c. and d.), and health claims (e. and f.). Exemplars in the left column represent the image-absent condition; those in the right column the image-present condition. In this case the corresponding function image is an image of a tooth.
Appendix AA8. Examples of carrier packaging displaying text-based claims and a function image. Package example – sports drink - with generic claims (panels a. and b.), nutrition claims (c. and d.), and health claims (e. and f.). Exemplars in the left column represent the image-absent condition; those in the right column the image-present condition. In this case the corresponding function image is an athletic figure diving towards a finishing line.
Appendix A49. Examples of carrier packaging displaying text-based claims and a function image. Package example – natural yogurt - with generic claims (panels a. and b.), nutrition claims (c. and d.), and health claims (e. and f.). Exemplars in the left column represent the image-absent condition; those in the right column the image-present condition. In this case the corresponding function image is an image of a tooth.
Appendix AA10. Examples of carrier packaging displaying text-based claims and a function image. Package example – cereal bar - with generic claims (panels a. and b.), nutrition claims (c. and d.), and health claims (e. and f.). Exemplars in the left column represent the image-absent condition; those in the right column the image-present condition. In this case the corresponding function image is an athletic figure diving towards a finishing line.
Appendix AA11. Examples of carrier packaging displaying text-based claims and a function image. Package example – oat biscuit - with generic claims (panels a. and b.), nutrition claims (c. and d.), and health claims (e. and f.). Exemplars in the left column represent the image-absent condition; those in the right column the image-present condition. In this case the corresponding function image is a three-quarter outline of a red heart.