This thesis has been submitted in fulfilment of the requirements for a postgraduate degree (e.g. PhD, MPhil, DClinPsychol) at the University of Edinburgh. Please note the following terms and conditions of use:

- This work is protected by copyright and other intellectual property rights, which are retained by the thesis author, unless otherwise stated.
- A copy can be downloaded for personal non-commercial research or study, without prior permission or charge.
- This thesis cannot be reproduced or quoted extensively from without first obtaining permission in writing from the author.
- The content must not be changed in any way or sold commercially in any format or medium without the formal permission of the author.
- When referring to this work, full bibliographic details including the author, title, awarding institution and date of the thesis must be given.
A SYSTEMATIC REVIEW AND META-ANALYSIS OF PSYCHOLOGICAL INTERVENTIONS FOR INFORMAL DEMENTIA CAREGIVERS

Victoria Kinnear
Doctorate in Clinical Psychology
The University of Edinburgh
March 2012
D. Clin. Psychol. Declaration of own work

This sheet must be filled in (each box ticked to show that the condition has been met), signed and dated, and included with all assessments - work will not be marked unless this is done

Name: Victoria Kinnear
Assessed work: Thesis
(please circle)

Title of work:
I confirm that all this work is my own except where indicated, and that I have:

Read and understood the Plagiarism Rules and Regulations ✓

• Composed and undertaken the work myself ✓
• Clearly referenced/listed all sources as appropriate ✓
• Referenced and put in inverted commas any quoted text of more than three words (from books, web, etc) ✓
• Given the sources of all pictures, data etc. that are not my own ✓
• Not made undue use of essay(s) of any other student(s) either past or present (or where used, this has been referenced appropriately) ✓
• Not sought or used the help of any external professional agencies for the work (or where used, this has been referenced appropriately) ✓
• Not submitted the work for any other degree or professional qualification except as specified ✓
•Acknowledged in appropriate places any help that I have received from others (e.g. fellow students, technicians, statisticians, external sources) ✓
• Complied with other plagiarism criteria specified in the Programme Handbook ✓
• I understand that any false claim for this work will be penalised in accordance with the University regulations ✓

Signature …………………………………………… Date …30.03.2012………
Content and Format

The systematic review adheres to the author guidelines issued by the journal ‘Psychology and Aging’ (see Appendix III).

The meta-analysis adheres to the guidelines issued by the Doctorate in Clinical Psychology handbook, The University of Edinburgh.

The thesis journal article adheres to the author guidelines issued by the journal ‘The Gerontologist’ (see Appendix IV).
### Table of Contents

Acknowledgements ix  
List of tables x  
List of figures xi  
Thesis Abstract xiii

**Systematic Review**  
*The efficacy and quality of dementia caregiver interventions since 1993*

1.0 Introduction 4  
1.1 Informal dementia caregivers 5  
1.2 Stress process model 6  
1.3 Caregiver interventions 8  
1.4 Criticisms of the literature 9  
1.4.1 Methodological clarity 9  
1.4.2 Sample selection 10  
1.4.3 Intervention design 10  
1.4.4 Measures of change 11  
1.4.5 Data analysis & outcome reporting 12  
1.5 Summary 13

2.0 Methodology 15  
2.1 Search process 15  
2.2 search strategy 15  
2.3 Assessment of methodological quality 16  
2.4 Inclusion criteria 16  
2.5 Data Synthesis 17

3.0 Results 18  
3.1 Search process 18  
3.2 Assessment of methodological quality 19  
3.3 Description of characteristics of the review 20  
3.4 Intervention Efficacy 25  
3.4.1 All interventions 25  
3.4.2 Educational Interventions 25  
3.4.2.1 Education 26  
3.4.2.2 Psychoeducation 27  
3.4.3 Skills training 27  
3.4.3.1 Behaviour management 28  
3.4.3.2 Coping skills 29  
3.4.4 Supportive counselling 29  
3.4.5 Multicomponent interventions 31  
3.4.6 Cognitive Behaviour Therapy 32

4.0 Discussion 33  
4.1 Impact of caregiver interventions 33  
4.1.1 Educational Interventions 33  
4.1.2 Skills training 33  
4.1.3 Supportive counselling 34  
4.1.4 Multicomponent interventions 35  
4.1.5 Cognitive behaviour therapy 35
### Table of Contents

#### Systematic Review

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>4.0 Discussion</strong></td>
<td></td>
</tr>
<tr>
<td>4.2 Revisiting methodological criticisms of Knight et al. (1993)</td>
<td>36</td>
</tr>
<tr>
<td>4.2.1 Methodological clarity</td>
<td>36</td>
</tr>
<tr>
<td>4.2.2 Sample selection &amp; allocation</td>
<td>37</td>
</tr>
<tr>
<td>4.2.3 Intervention design</td>
<td>37</td>
</tr>
<tr>
<td>4.2.4 Data collection</td>
<td>38</td>
</tr>
<tr>
<td>4.2.5 Data analysis &amp; outcome reporting</td>
<td>40</td>
</tr>
<tr>
<td>4.3 Limitations in the review</td>
<td>40</td>
</tr>
<tr>
<td>4.4 Clinical implications</td>
<td>42</td>
</tr>
<tr>
<td>4.5 Summary</td>
<td>42</td>
</tr>
<tr>
<td><strong>5.0 References</strong></td>
<td></td>
</tr>
</tbody>
</table>

#### Meta-analysis

_Efficacy of Cognitive behaviour therapy for dementia caregivers_

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1.0 Aims &amp; Hypotheses</strong></td>
<td>62</td>
</tr>
<tr>
<td>1.1 Aims</td>
<td>62</td>
</tr>
<tr>
<td>1.2 Hypotheses</td>
<td>62</td>
</tr>
<tr>
<td><strong>2.0 Methodology</strong></td>
<td>64</td>
</tr>
<tr>
<td>2.1 Search protocol</td>
<td>64</td>
</tr>
<tr>
<td>2.2 Inclusion criteria</td>
<td>66</td>
</tr>
<tr>
<td>2.2.1 Participants</td>
<td>66</td>
</tr>
<tr>
<td>2.2.2 Interventions</td>
<td>65</td>
</tr>
<tr>
<td>2.2.3 Outcome foci</td>
<td>67</td>
</tr>
<tr>
<td>2.2.4 Study methodologies</td>
<td>67</td>
</tr>
<tr>
<td>2.3 Search methods</td>
<td>68</td>
</tr>
<tr>
<td>2.4 Assessment of methodological quality</td>
<td>68</td>
</tr>
<tr>
<td>2.5 Data extraction</td>
<td>69</td>
</tr>
<tr>
<td>2.6 Statistical synthesis of the findings</td>
<td>70</td>
</tr>
<tr>
<td>2.6.1 Analysis of the impact of CBT</td>
<td>70</td>
</tr>
<tr>
<td>2.6.2 Test of homogeneity</td>
<td>72</td>
</tr>
<tr>
<td>2.6.3 Analysis of publication bias</td>
<td>73</td>
</tr>
<tr>
<td>2.6.4 Meta-regression &amp; subgroup analyses</td>
<td>73</td>
</tr>
<tr>
<td>2.6.5 Interpretation of effect</td>
<td>74</td>
</tr>
<tr>
<td><strong>3.0 Results</strong></td>
<td>75</td>
</tr>
<tr>
<td>3.1 Search Process</td>
<td>75</td>
</tr>
<tr>
<td>3.2 Assessment of methodological quality</td>
<td>76</td>
</tr>
<tr>
<td>3.3 Descriptive characteristics of the intervention studies</td>
<td>81</td>
</tr>
<tr>
<td>3.4 The effect of CBT for caregivers</td>
<td>85</td>
</tr>
<tr>
<td>3.4.1 Depression</td>
<td>85</td>
</tr>
<tr>
<td>3.4.2 Burden</td>
<td>86</td>
</tr>
<tr>
<td>3.4.3 Mental health</td>
<td>88</td>
</tr>
<tr>
<td>3.4.4 Adaptive coping</td>
<td>89</td>
</tr>
<tr>
<td>3.4.5 Dysfunctional thoughts about caregiving</td>
<td>91</td>
</tr>
<tr>
<td>3.5 Subgroup analyses of the effect of CBT according to intervention characteristics</td>
<td>92</td>
</tr>
<tr>
<td>3.5 Subgroups analyses of the effect of CBT according to care &amp; caregiver characteristics</td>
<td>97</td>
</tr>
</tbody>
</table>
# Table of Contents

## Meta-analysis

### 3.0 Results

3.7 Meta-regression: Predictive value of intervention characteristics on CBT outcome  
3.7.1 Length in sessions  
3.7.2 Length in hours  
3.8 Meta-regression: Predictive value of caregiver and care characteristics on CBT outcome  
3.8.1 Caregiver relationship  
3.8.1.1 Spouse  
3.8.1.2 Adult Child  
3.8.2 Caregiver gender  
3.8.3 Ethnic background

### 3.8 Meta-regression: Predictive value of caregiver and care characteristics on CBT outcome

3.8.1 Caregiver relationship  
3.8.1.1 Spouse  
3.8.1.2 Adult Child  
3.8.2 Caregiver gender  
3.8.3 Ethnic background

### 3.8 Meta-regression: Predictive value of caregiver and care characteristics on CBT outcome

4.0 Discussion

4.1 CBT as a means of alleviating distress & maladaptive coping  
4.2 Predictive value of care context & characteristics  
4.3 Predictive value of intervention characteristics  
4.4 CBT compared to other therapeutic caregiver interventions  
4.4.1 Educational interventions  
4.4.2 Skills training interventions  
4.4.3 Supportive counselling  
4.4.4 Multicomponent interventions

### 4.4 Multicomponent interventions

4.5 Methodological weaknesses of cognitive behavioural intervention Studies  
4.6 Methodological weaknesses of the current meta-analysis  
4.7 Clinical Implications of the current meta-analysis

### 4.7 Clinical Implications of the current meta-analysis

4.8 Summary

## Thesis Journal Article

*Efficacy of cognitive behaviour therapy for dementia caregivers*

### Abstract

1.0 Introduction  
1.1 Impact of caregiving  
1.2 Cognitive behavioural model of caregiver distress  
1.2.1 Inhibition of help seeking  
1.2.2 The expression of negative affect  
1.2.3 Level of involvement in care  
1.3 Cognitive behaviour therapy

### 1.3 Cognitive behaviour therapy

2.0 Methodology  
2.1 Search Method  
2.2 Inclusion criteria  
2.3 Assessment of methodological quality  
2.4 Data extraction  
2.5 Data analysis strategy
# Table of Contents

**Thesis Journal Article**

### 3.0 Results

- 3.1 Search process
- 3.2 Descriptive characteristics of included studies
- 3.3 The effect of CBT for caregivers
- 3.4 Impact of caregiver, care & intervention characteristics
  - 3.4.1 Length in sessions
  - 3.4.2 Length in hours
  - 3.4.3 Caregiver relationship
    - 3.4.3.1 Spouse
    - 3.4.3.2 Adult child
  - 3.4.4 Caregiver gender
  - 3.4.5 Ethnic background
- 3.5 Subgroup analyses of the effect of CBT
  - 3.5.1 Intervention characteristics
  - 3.5.2 Delivery method
  - 3.5.3 Type of dementia
  - 3.5.4 Care duration

### 4.0 Discussion

- 4.1 CBT as means of alleviate distress & maladaptive coping
- 4.2 Impact of care context & caregiver characteristics
- 4.3 Impact of intervention characteristics
- 4.4 Methodological weaknesses in CBT studies
- 4.5 Methodological weaknesses in this review
- 4.6 Clinical implications
- 4.7 Summary

### 5.0 References

**Thesis References**

**Appendices**

- Appendix I: Criteria for the assessment of methodological quality of empirical reviews
- Appendix II: Summary of reviews excluded based on methodological quality
- Appendix III: ‘Psychology and Aging’ publication guidelines used for the systematic review
- Appendix IV: ‘The Gerontologist’ publication guidelines used for the thesis Journal article

---

**References**

**Appendices**

- Appendix I: Criteria for the assessment of methodological quality of empirical reviews
- Appendix II: Summary of reviews excluded based on methodological quality
- Appendix III: ‘Psychology and Aging’ publication guidelines used for the systematic review
- Appendix IV: ‘The Gerontologist’ publication guidelines used for the thesis Journal article
Acknowledgements

The completion of this thesis project would not have been made possible without the contribution of a number of people. First and foremost, I would like to thank my supervisor, Dr Ken Laidlaw. I am extremely grateful for his expert advice, guidance and support. Without his encouragement and belief in my capability, this project would not have been completed. I would also like to thank my elective placement supervisor, Dr Simon Lloyd for his guidance and support in my final year.

I am extremely grateful for the support and advice of Jenny Munro and Karen Mackenzie. Their kindness has been immense and greatly appreciated through my training. I am indebted to my friends and colleagues in the mental health services in Elgin for their guidance and support throughout my training. In particular, I would like to thank my ‘extended’ family, Lourensa Goosen, Helen Jones, Albert Kinnear, and Elizabeth McLaughlan, Pat Haslam and Maria Dawson for their encouragement and support through the stressful times. I would also like to thank Angus Macbeth for sharing his meta-analytic knowledge.

I am tremendously grateful for the support, encouragement and patience of my friends and family. I would particularly like to thank my parents for supporting me throughout my studies. Their love and encouragement, countless cups of coffee and chocolate got me through.

I would like to thank the members of staff at Quarriers Carers for their advice and assistance.

I am extremely grateful to the carers, who shared their experiences with me and inspired this thesis project.
List of Tables

Systematic Review

The efficacy and quality of dementia caregiver interventions since 1993

Table 1: Methodological Quality of included reviews 18
Table 2: Summary of the characteristics of the included reviews 21

Meta-analysis

Table 1: Summary of the outcome of the intervention study quality evaluation 79
Table 2: Summary of Included Study Characteristics 82
Table 3: Subgroup analyses of the effect of CBT on outcomes according to control type 94
Table 4: Subgroup analysis of the impact of delivery method on caregiver outcomes 96
Table 5: Subgroup analysis of the impact of delivery method on caregiver outcomes 100
Table 6: Subgroup analysis of impact of the average duration of care provision on caregiver outcomes 102
Table 7: Summary of simple meta-regression analyses for intervention characteristics 105
Table 8: Meta-regressional analyses of the impact of caregiver characteristics on outcomes 109

Thesis Journal Article

Efficacy of Cognitive behaviour therapy for dementia caregivers: A meta-analysis

Table 1: Descriptive statistics of intervention and caregiver characteristics 143
Table 2: Intervention effects on caregiver burden, depression, mental health and adaptive coping 145
Table 3: Summary of simple meta-regression analyses for intervention characteristics 148
Table 4: Subgroup analysis of impact of control type on caregiver outcomes 153
List of Figures

Systematic Review

The efficacy and quality of dementia caregiver interventions since 1993

Figure 1. Pearlin et al.’s (1990) stress process model of caregiver distress 7
Figure 2. Summary of systematic search process 17

Meta-analysis

Efficacy of Cognitive behaviour therapy for dementia caregivers

Figure 1. Summary of the search process 76
Figure 2. Forest Plot of the study effect sizes for the impact of CBT on caregiver depression 85
Figure 3. Funnel plot of the precision of study effect sizes for the impact of CBT on depression 86
Figure 4. Forest Plot of the study effect sizes for the impact of CBT on caregiver burden 87
Figure 5. Funnel plot of the precision of study effect sizes for the impact of CBT on burden 87
Figure 6. Forest Plot of the study effect sizes for the impact of CBT on caregiver mental health 88
Figure 7. Funnel plot of the precision of study effect sizes for the impact of CBT on caregiver mental health 89
Figure 8. Forest Plot of the study effect sizes for the impact of CBT on caregiver adaptive coping 90
Figure 9. Funnel plot of the precision of study effect sizes for the impact of CBT on caregiver adaptive coping 90
Figure 10. Forest Plot of the study effect sizes for the impact of CBT on caregiver dysfunctional thoughts 91
Figure 11. Funnel plot of the precision of effect sizes for the impact of CBT on caregiver dysfunctional thoughts 92
Figure 12. Regressional analysis of intervention session length & adaptive coping 103
Figure 13. Correlation between caregiver burden & the proportion of adult child caregivers participating in intervention studies 107
List of Figures

**Thesis Journal Article**

*Efficacy of Cognitive behaviour therapy for dementia caregivers: A meta-analysis*

- Figure 1. Summary of search process
- Figure 2. Regressional analysis of intervention session length & adaptive coping
- Figure 3. Correlation between caregiver burden & the proportion of adult child caregivers participating in intervention studies
Thesis Abstract

Purpose: This review evaluates the impact of intervention studies for informal dementia caregivers. Methods: Meta-analytic methods were used to integrate the findings of 14 intervention studies evaluating the cognitive behaviour therapy for caregivers. Meta-regression and analysis of variance were used to evaluate the impact of caregiver and intervention characteristics on the outcomes. Results: Significant effects sizes were found for the impact of CBT on depression, burden, and mental health difficulties, $g^* = -0.55$, 95% CI [-0.92, -0.19], $g^* = -0.37$, 95% CI [-0.57, -0.17], and $g^* = -0.54$, 95% CI [-0.78, -0.30], respectively. CBT facilitated more adaptive coping, with significant effects on caregiver adaptive coping and dysfunctional thoughts, $g^* = 0.48$, 95% CI (0.02, 0.24) and $g^* = -1.33$, 95% CI (-2.22, -0.44). The impact of CBT on caregiver outcomes was associated with the nature of the study control condition, and the intervention delivery, timing and specificity to dementia type. Caregiver ethnicity and gender were not predictive of the CBT outcome. Implications: Overall, caregiver interventions are efficacious in alleviating caregiver distress and facilitating more adaptive coping responses, with prominent effects established for CBT. Future research needs to consider CBT as part of multi-intervention approach tailored to the needs of caregivers across the disease progression. Further improvements are needed, with greater consideration of the impact of the intervention design in alleviating caregiver distress.
Systematic Review

Systematic Review of the Efficacy and Quality of Dementia Caregiver Interventions Since 1993
Systematic Review of the Efficacy and Quality of Dementia Caregiver Interventions Since 1993

**Background:** Increasing amounts of research have evaluated the impact of caregiver interventions. However, the methodological quality of the research has impeded the accuracy of the conclusions drawn. **Methods:** The outcomes of 12 systematic reviews were assimilated to evaluate the efficacy and quality of interventions for dementia caregivers. **Results:** Overall, the impact of caregiver intervention was significant in improving depression, and well-being. When specific interventions were considered, significant effects were found on depression and well-being for psychoeducation, and multicomponent interventions, with the most prominent effects found for CBT. Little evidence was established to indicate that supportive counselling, skill training or didactic educational interventions had a significant impact on caregiver distress. **Conclusions:** Changes in the research methodology are apparent. However, the criticisms of Knight et al. (1993) largely remain valid. Further improvements are needed, with greater consideration of the impact of the interventions design in alleviating caregiver distress.

*Keywords:* informal caregivers, dementia, interventions, review

*Word Count: 7878*
Systematic Review of Efficacy and Quality of Dementia Caregiver Interventions since 1993

1.0 Introduction

Worldwide a profound and irreversible demographic shift is occurring that is unprecedented in human history (Laidlaw, 2010). The population is aging globally and equally in the developed and developing world (Kinsella & Wan, 2009).

The change in the population demographic has seen an increase in people aged 65 and over by 1.7 million in the United Kingdom since 1985 (Kinsella & Wan, 2009; United Nations [UN], 2010). This trend is expected to continue over the next 30 years (Alzheimer Disease International, 2010). As dementia is among the prominent causes of disability for older adults, individuals aged 65 and over, this has significant implications for the provision of care within services supporting the health and wellbeing of this population group (UN, 2010).

1.1 Informal dementia caregivers

The care for individuals with dementia is widely recognised as being provided primarily by non-professional, family caregivers (Sorensen & Conwell, 2011). Whilst the experiences of these family members vary greatly, a wide range of potential mental and physical health, social and financial consequences have been consistently identified (Czaja, Schulz, Lee, & Belle, 2003; Mitrani et al., 2006; Ory, Yee, Tennstedt & Schulz, 2000; Sanders, Ott, Kelber, & Noonan, 2008; Schulz & O’Brien, 1994; Schulz, Gallagher-Thompson, Haley & Czaja, 2000). In particular, the prevalence of depression and anxiety is higher for dementia caregivers than the figures obtained for the general population and other caregiver populations (Czaja et al., 2003; Mitrani et al., 2006; Ory et al., 2000).
This discovery led to the development of models of caregiver distress and recognition of the need for caregiver interventions in national guidelines (Scottish National Dementia Strategy, 2011).

1.2 Stress Process Model

The stress process model conceptualised caregiver stress as an ongoing process that fluctuates over time (Pearlin, Mullan, Semple & Skaff, 1990). The experience and manifestation of stress, is mediated by the personal characteristics and history of the caregiver, the nature and context of care, and conflicts between the multiple roles held by caregivers over available personal resources, outlined in figure 1 (Haley et al., 1996; Schulz & Williamson, 1991).

The care role is directly associated with an increasing number of primary stressors. These are roles or tasks that specifically relate to caregiving, such as the requirement for continuous supervision and the care recipient’s increasing dependency to manage their physical, emotional needs (Jansson, Nordberg & Grafstrom, 2001; Pearlin et al., 1990). However, caregivers seldom hold only one role and instead function within multiple relational roles, such as carer, (grand-) parent, employee, partner, and friend (Haley et al., 1996). Strain can be created when these primary stressors or care responsibilities impede a caregiver’s investment in other valued roles or when the combined role demands outweigh the caregiver’s coping ability (Pearlin et al., 1990). Caregiver may experience a sense of the loss of self identity if the caregiver role is dominant over these other roles. Subsequently, Pearlin et al. (1990) theorised that depression may result when an individual’s self identity is solely defined by the act of caregiving (Pearlin et al., 1990).

As previously stated, caregiver strain can be established as a result of multiple role demands outweighing the coping ability or resources of the caregiver (Pearlin et
However, appraisals of personal resource availability are subjective and influenced by the carer’s sense of self or intrapsychic strains (Losada et al., 2008; Pearlin et al., 1990). Anxiety or a desire to relinquish care may manifest when caregivers perceive the role as burdensome and coping or care skills as inadequate (Haley et al., 1996). The availability of external support, such as supportive family or professional support networks, may mediate perceptions of the role as strenuous (Haley et al., 1996). Personal characteristics may also predispose individuals to experience stress through differences in emotional processing or coping (Adams, Aranda, Kemp & Takagi, 2002; Haley et al., 2004; Pinquart & Sorensen, 2011).

Whilst the stress process model provides an understanding of the mechanisms of caregiver distress, it lacks adequate recognition of cultural and cohort influences on caregiver distress. Culturally derived values contribute to a sense of obligation felt to care for family members (Aranda & Knight, 1997; Knight & Sayegh, 2010). These values subsequently influence caregivers’ perception of the acceptability of external support (Aranda & Knight, 1997; Lang, 2001; Knight, 2004; Knight & Sayegh, 2010).
Note. SES = socioeconomic status; ADL = activities of daily living; IADL = instrumental activities of daily living.

Figure 1. Pearlin et al.’s (1990) stress process model
1.3 Caregiver interventions

The stress process model has proposed that the processes and mechanisms of caregiver distress are complex (Pearlin et al., 1990). In reflection of this, the interventions derived from this model, have had a broad focus (Mittelman, Roth, Clay, & Haley, 2007; Pearlin et al., 1990). These interventions have been aimed at reducing the personal resource demands experienced by caregiver or improving the functioning of the care recipient of caregiver (Bourgeois, Schulz, Burgio & Beach., 2002). This has been achieved by developing supportive peer networks, providing temporary alternative care or information relating to dementia specific care skills (Bourgeois, Schulz, Burgio & Beach., 2002; Burgio, Schmid & Johnson, 2008; Mittelman et al., 2007; Llanque, 2011). Furthermore, the growing recognition of appraisals as moderators of caregiver affect led to the exploration of cognitive behaviour therapy (CBT) for caregivers (Gallagher-Thompson & Steffen, 1994). The dysfunctional thoughts experienced by caregivers tend to relate to beliefs held about their care competency, self-worth and conceptualisation of dementia. As such, CBT for caregivers has focused on increasing dementia awareness and care skills, regulating affect and modifying behavioural and cognitive responses to dementia (Gallagher-Thompson et al., 2010; Losada et al., 2008).

To date, the most influential research examining psychosocial interventions for caregivers has focused two large scale multi-site projects. The Resources for Enhancing Alzheimer’s Caregiver Health (REACH) project was developed in response to emerging criticism of early research quality, see section 1.4 (Schulz et al., 2003). A range of interventions have been evaluated which have incorporated environmental adaptation, peer support, family systems therapy, psychoeducation, behavioural management training, and coping techniques (Burns, Nichols,
Martindale-Adams, Graneyl, & Lummus, 2003; Gitlin et al., 2003; Rabinowitz et al., 2006; Schulz et al., 2003). The second project, REACH II explicitly focused on tailoring interventions to the cultural background of caregivers following the finding that culturally held beliefs and values influence caregiving practices (Burgio et al., 2008; Gallagher-Thompson et al., 2003). Positive gains were established for both of these projects, with evidence of these interventions significantly improving caregiver burden, depression, health and well-being (Belle et al., 2006; Elliott, Burgio & DeCoster, 2010; Gitlin et al., 2003).

1.4 Criticisms of the literature

By the mid-nineties, the emergence of a growing quantity of caregiver intervention studies led to attempts to integrate the evidence and assess the quality of findings thus far. The meta-analysis by Knight, Lutzky, and Macofsky-Urban (1993) represented one such attempt. Knight et al. (1993) found small to moderate effects on caregiver depression for respite, $d = 0.63$, individual psychological interventions, $d = 0.58$, and group interventions, $d = 0.31$ (Knight et al., 1993). Whilst this review was not the first, the conclusions drawn were central in highlighting difficulties with intervention design and research quality.

Inconsistencies across the study outcomes led Knight et al. (1993) to consider the impact of the study design. Methodological weaknesses were, subsequently, identified in the clarity and precision of reporting of methods and outcome, sample section, intervention design and measurement of change (Knight et al., 1993). This meta-analysis concluded “The appropriate question now is not whether interventions work but rather what interventions work best at what levels of strength with which kinds of caregivers caring for relatives with specific kinds of impairments” (Knight et al., 1993, p.247).
1.4.1 Methodological clarity.

Knight et al (1993) criticised the accounts of the research methodology as lacking detail. In particular, the reports of processes used to allocate participants to study groups and the details of the sample characteristics were noted as particularly impoverished (Czaja, Eisdorfer & Schulz, 2000; Schulz, 2001). The latter has limited the ability to control for potentially confounding variables. This is particularly significant given the diversity in the caregiver population (Knight et al., 1993).

The descriptions of control conditions had also been highlighted as being vague. Often research studies have used broad, generic terms, such as ‘treatment as usual’ or ‘respite’. These have been applied to conditions without clarification of the precise nature of the intervention or level of support represented by these terms (Brodaty, Thomson, Thompson & Fine, 2005; Monahan, Greene & Coleman, 1992). This lack of methodological clarity has significantly limited the ability to replicate research.

1.4.2 Sample Selection.

In early studies, sample recruitment transpired through health and community services (Chang, 1999; Toseland & Rossiter, 1989). This has proven problematic as only a small proportion of caregivers access these services (Toseland & Rossiter, 1989). Furthermore, caregivers who have sough support have tended to report less negative affect than has been evident in the general caregiver population (Toseland & Rossiter, 1989). A disproportionate number of highly educated, female, Caucasian and spousal caregivers also participated in these studies (Bullock, Crawford & Tennstedt, 2003; Gallagher-Thompson et al., 2003; Grossfeld-Schmitz et al., 2010; Robinson, Buckwalter & Reed, 2005; Wettstein, Schmid, & Konig, 2004). Given the difficulties recruiting caregivers who do not access services, it is difficult to determine
whether these characteristics are associated with an increased willingness to care, an increased acceptability of services in particular caregiver populations or reflect a sampling bias.

1.4.3 Intervention Design.

By 1993, intervention design was not typically grounded in psychological theory or sensitive to the disease progression (Knight et al., 1993). However, the degenerative nature of dementia means that the care demands and skills, and level of caregiver involvement continuously change (Zarit, 1996). A unimodal intervention delivered at a discrete time point is, therefore, unlikely to adequately meet the caregiver's evolving needs (Hinchliffe, Hyman, Blizard & Livingston, 1995). The longevity of therapeutic gain from unimodal interventions has also been questioned given the nature of the change in caregiver support needs (Bourgeois, Schulz & Burgio, 1996). Similarly, the duration of early interventions was criticised as insufficient to facilitate positive change, particularly as caregiver interventions had tended to be shorter than standard brief psychological interventions (Bourgeois et al., 1996; Knight et al., 1993; Schulz, 2001; Serralta, Pole, Nunes, Eizirik & Olsen, 2010). However, Knight et al. (1993) noted that the optimal intervention duration had not been extensively evaluated.

1.4.4 Measures of change.

Early interventions were criticised as not routinely having been grounded in psychological theory (Gallagher-Thompson et al., 2000). This was suggested to limit the development of consistent links between the aims of the intervention and selection of outcomes as the theoretical underpinning of an intervention should define the area targeted for change (Gallagher, 1985). The selection of outcomes measures should, therefore, have been defined by the theoretical focus of the intervention (Schulz.
Biegel, Morcyz & Vistainer, 1989). However, the lack of explicit theoretical underpinning in research evaluating interventions for caregivers led to a broad range of measures being utilised without a clear rationale for considering particular outcomes (Schulz et al., 2002). The sensitivity of measures to detect change was also not consistently considered during the selection process (Gallagher-Thompson et al., 2000; Schulz, 2001). The impact of interventions may, therefore, have been underestimated. In addition, the lack of measure sensitivity further limited the ability to evaluate the long term impact of interventions for outcomes, such as burden, which are known to be insensitive to change (Zarit & Leitsch, 2001; Zarit, Orr, & Zarit, 1985).

1.4.5 Data analysis and outcome reporting.

Within study analyses, the accountability of confounding variables has been highlighted as impoverished (Knight et al., 1993). Whilst biases in sampling methods were acknowledged, the effects of sample characteristics were not consistently considered within the evaluation (Brodaty et al., 2005). In addition, the level of community service use for caregivers participating in intervention studies was often not evaluated as a moderating variable. (Knight et al., 1993; Wray et al., 2010). The impact of this omission was apparent when Knight et al (1993) determined that the effect of respite was masked by control groups having received higher ‘doses’ than the intervention group through access to community respite (Knight et al., 1993). This has been compounded by a lack of transparency in outcome reporting (Knight et al., 1993). Inadequate explanations of the direction of change has been suggested as a further means in which estimates of effects may be over- or under- represented (Knight et al., 1993).
For instance, significant between group differences were reported by Zarit, Antony and Boutsellis (1987) without indicating that the findings were attributable to changes in the distress experienced by the control and not the intervention groups. The reporting of findings, particularly non-significant outcomes, has also been criticised as imprecise as the specific figures are often omitted from the report (Knight et al., 1993). This limits the consolidation of evidence through meta-analytic review.

1.5 Summary

Recognition of the high prevalence of negative health, social and financial consequences for caregivers has led to the development and evaluation of a wide range of interventions designed to ameliorate these effects (Martin-Carrasco et al., 2009; Sorensen & Conwell, 2011; Williams et al., 2010). These have aimed at reducing care demands and increasing caregiver competency and adaptive coping.

Early empirical reviews highlighted the considerable variability in the psychosocial outcomes of the research exploring the impact of caregiver psychosocial interventions (Knight et al., 1993). This was attributed to the poor methodological quality of the early research (Knight et al., 1993).

Whilst subsequent empirical reviews have been published, these have not systematically re-evaluated the validity of the methodological criticisms proposed by Knight et al. (1993). This would be important in limiting repetition of previous methodological flaws which could undermine any conclusions drawn about the efficacy of these interventions.
This study, therefore, aims to evaluate the efficacy and quality of caregiver intervention research to determine the current validity of the criticisms of Knight et al. (1993). The evaluation will focus on assimilating the outcomes of systematic and meta-analytic reviews, published after 1993, to allow consideration to be given to the impact of methodological weakness on the quality of empirical reviews. To date, this has not been explicitly explored.
2.0 Methods

2.1 Search Process

Systematic and meta-analytic reviews of interventions studies evaluating interventions for informal dementia caregivers were examined. A search protocol was developed based on the recommendations of Higgins and Green (2011), the Centre of Reviews and Dissemination (CRD, 2009) and methods utilised by Knight et al. (1993).

2.2 Search Strategy

Electronic databases, namely Medline, ProQuest, PsychInfo, Embase, CINAHL, Psychology and behavioural sciences collection, and the Cochrane Library, were searched in April and September 2011. The search terms were caregiv*, carer, dement*, Alzheimer’s disease, psychotherapy, intervention, counselling, support group, self help, *education, training, cognitive behavi* therapy, review and meta-analysis. The terms were based on those used by Knight et al. (1993) and adapted according to the keywords of studies located in a test search. Use of an asterisk allowed the identification of truncated words.

Additional studies were indentified by cross-referencing and hand searching online journals identified by existing systematic reviews as sources of frequently published caregiver intervention studies (Knight et al., 1993; Pinquart & Sorensen, 2003 & 2006). These included The Gerontologist, the Journals of Gerontology, Journal of Gerontological Social Work, Journal of Gerontological Nursing, Journal of nursing research, Psychology and Aging, and Aging and Mental Health.

Literature relevance was established by comparing the study to pre-determined set of inclusion criteria.
2.3 Assessment of methodological quality

Relevant reviews were assessed for methodological quality. The assessment criteria were derived by combining existing measures of quality assurance (QA), including the Scottish Intercollegiate Guideline Network’s (SIGN) methodological checklist, Cochrane’s criteria for risk of bias, and the assessment of multiple systematic reviews (Higgins & Green, 2011; Shea et al., 2007; Scottish Intercollegiate Guideline Network [SIGN], 2008). The criteria were developed with consideration of identified methodological weakness (Knight et al., 1993).

In accordance with the Cochrane recommendations, a composite QA measure, see appendix one, was used that shares attributes with a domain based evaluation (Higgins & Green, 2011). Areas of potential bias are considered and weighted according to the likelihood of bias being introduced (Higgins & Green, 2011).

2.4 Inclusion Criteria

This review considered narrative and meta-analytic reviews evaluating quantitative outcomes of interventions for informal, unpaid dementia caregivers who provide care in the community. Reviews were required to be published in English after 1993. Non-pharmacological, psychological caregiver interventions, such as psychoeducation, psychosocial and multicomponent interventions, were included. Care services such as respite and case management were not considered comparable to these interventions and where therefore excluded. Consistent with Knight et al.’s (1993) criteria, outcomes were focused on negative affect and included depression, anxiety, subjective burden, and stress.
2.5 Data Synthesis

Information was extracted relating to the characteristics of the reviews and included studies, search methods and outcome.

Narrative synthesis, a textual approach to analysis considering the relationship between and within studies, was used to aggregate the outcomes (CRD, 2009).

Data were considered by review type and the outcomes weighted according to methodological rigor to reduce the risk of heterogeneity biases (Moher, Jadad & Klassen, 1998). Existing intervention classification systems were used (Acton & Kang, 2001; Pinquart & Sorensen, 2002).
3.0 Results

3.1 Search Process

The search retrieved 1342 articles, see figure 2 below. Ninety-six per cent failed to meet inclusion criteria, with papers excluded because the outcomes or study design was not appropriate (e.g. Bharucha et al., 2009; Olazarán et al., 2010; Pinquart & Sörensen, 2011; Spijker et al., 2008) or the study had professional or non-dementia caregiver participants (e.g. Sorensen, Pinquart & Duderstein, 2002; Gallagher-Thompson & Coon, 2007; Parker, Mills & Abbey., 2008; Schulz, Martire & Klinger, 2005). After removing duplicates, 31 reviews remained, with 14 meeting inclusion criteria.

Figure 2. Summary of systematic search process
3.2 Assessment of methodological quality

QA criteria were used to evaluate 14 reviews. Although all reviews had some limitations, the review methodology of Cooke, McNally, Mulligan, Harrison and Newman (2001) and Bourgeois, Schulz and Burgio (1996) was sufficiently poor to warrant exclusion. These reviews gave poor accounts of the review process, restricting reliable judgements of quality. Homogeneity biases were likely in these reviews as outcomes assimilated a broad range of interventions. The quality of included studies was not evaluated. Although this was not undertaken by Gitlin et al., (2003) this omission was justifiable given that level of intervention specificity and subsequent, small number of studies.

Methodological weaknesses were evident in the included reviews, see table 1. Sufficient detail of the processes was not always provided. The use of broad, overlapping intervention categories led Selwood, Johnston, Katona, Lyketsos and Livingston (2007) to classify 13 per cent of studies in multiple groups. Confounding variables, such as caregiver and intervention characteristics, and publication biases were not generally considered in the analyses of the reviews.
### Table 1.
Methodological Quality of included reviews

<table>
<thead>
<tr>
<th>Review</th>
<th>Systematic methodology</th>
<th>Detailed description of search process (i.e. replicable)</th>
<th>N of databases searched</th>
<th>'Grey' literature searched</th>
<th>Assessment of quality</th>
<th>Search &amp; quality assessments undertaken by more than 2</th>
<th>Statistical analysis</th>
<th>Effect sizes reported</th>
<th>Interventions reviewed by type</th>
<th>Assessment of likelihood of publication bias</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acton &amp; Kang (2001)</td>
<td>Y</td>
<td>Y+</td>
<td>5</td>
<td>Y</td>
<td>Y</td>
<td>UC</td>
<td>Y</td>
<td>Y</td>
<td>Y+</td>
<td>N</td>
</tr>
<tr>
<td>Pusey &amp; Richards (2001)</td>
<td>Y</td>
<td>Y+</td>
<td>10</td>
<td>Y+</td>
<td>Y</td>
<td>UC</td>
<td>N</td>
<td>N1</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>Brodaty et al. (2003)</td>
<td>Y</td>
<td>Y</td>
<td>7</td>
<td>N</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>Gitlin et al. (2003)</td>
<td>Y</td>
<td>Y</td>
<td>0</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>Y</td>
<td>Y</td>
<td>Y2</td>
<td>N</td>
</tr>
<tr>
<td>Peacock &amp; Forbes (2003)</td>
<td>Y</td>
<td>Y</td>
<td>3</td>
<td>N</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
<td>N1</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>Pinquart &amp; Sorensen (2006)</td>
<td>Y</td>
<td>Y</td>
<td>4</td>
<td>N</td>
<td>UC</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y+</td>
<td>N</td>
</tr>
</tbody>
</table>

**Note.**
- Y = yes, adequately addressed; Y+ = yes, addressed well; Y- = yes, but poorly addressed; N = not addressed; UC = unclear,
- 1. For SRs, this indicates whether the level of statistical significance for findings was reported. This denotes that significance was not reported.
- 2. Interventions were all Multicomponent interventions. These interventions differed in the included components.
## Methodological Quality

<table>
<thead>
<tr>
<th>Review</th>
<th>Systematic methodology</th>
<th>Detailed description of search process (i.e. replicable)</th>
<th>N of databases searched</th>
<th>'Grey' literature searched</th>
<th>Assessment of quality</th>
<th>Search &amp; quality assessments undertaken by more than 2</th>
<th>Statistical analysis</th>
<th>Effect sizes reported</th>
<th>Interventions reviewed by type</th>
<th>Assessment of likelihood of publication bias</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cooper et al. (2007)</td>
<td>Y</td>
<td>Y</td>
<td>6</td>
<td>Y</td>
<td>UC</td>
<td>N</td>
<td>N</td>
<td>N1</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>Selwood et al. (2007)</td>
<td>Y</td>
<td>Y-</td>
<td>UC</td>
<td>N</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
<td>N1</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>Thompson et al. (2007)</td>
<td>Y</td>
<td>Y+</td>
<td>24</td>
<td>Y+</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>Goy et al. (2010)</td>
<td>Y</td>
<td>Y</td>
<td>3</td>
<td>N</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
<td>N1</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>Schoenmakers et al. (2010)</td>
<td>Y</td>
<td>Y</td>
<td>6</td>
<td>Y</td>
<td>UC</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Chien et al. (2011)</td>
<td>Y</td>
<td>Y+</td>
<td>15</td>
<td>Y</td>
<td>UC</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y-</td>
<td>Y</td>
</tr>
</tbody>
</table>

**Note.**

Y= yes, adequately addressed; Y+= yes, addressed well; Y-= yes, but poorly addressed; N= not addressed; UC= unclear.

1. For SRs, this indicates whether the level of statistical significance for findings was reported. This denotes that significance was not reported.

2. Interventions were all Multicomponent interventions. These interventions differed in the included components.
3.3 Descriptive Characteristics of the Reviews

Reviews integrated the outcomes of 9 to 127 intervention studies undertaken between 1982 and 2009, summarised in table 2 below. Despite overlaps in the review periods, 54 per cent of the primary studies featured in one review. Two studies, Brennan, Moore, & Smyth (1995) and Chang (1999), featured in the majority of the reviews. Thirty-six per cent of the reviews focused on one intervention type or delivery method. Study type was restricted to control trials by 79 per cent of reviews.
Table 2.

Summary of the characteristics of the included reviews

<table>
<thead>
<tr>
<th>Review</th>
<th>Review type</th>
<th>Period covered</th>
<th>k</th>
<th>Type of studies</th>
<th>N</th>
<th>Types of interventions</th>
<th>Primary Caregiver outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brodaty et al. (2003)</td>
<td>MA</td>
<td>1985-2000</td>
<td>30</td>
<td>NL</td>
<td>2040</td>
<td>All interventions</td>
<td>Mental health, burden, affect</td>
</tr>
<tr>
<td>Gitlin et al. (2003)</td>
<td>MA</td>
<td>NR</td>
<td>9</td>
<td>RCTs</td>
<td>1222</td>
<td>MCI</td>
<td>Depression, Burden</td>
</tr>
</tbody>
</table>

Note. k = number of studies included in the review
SR = systematic review, MA = meta-analysis, CT = control trial, RCT = randomised control trial, CS = cohort studies, RM = repeated measures, ITS = interrupted time series, NL = not limited
MCI = multicomponent intervention, CBT = cognitive behaviour therapy, CM = case management, TBI = technological-based intervention, EDI = educational interventions, PEI = psychoeducational intervention, ST = skills training, BMT = behavioural management training, CST = coping skills training, CRI = care recipient interventions, SC = supportive counselling
<table>
<thead>
<tr>
<th>Review</th>
<th>Review type</th>
<th>Period covered</th>
<th>k</th>
<th>Type of studies</th>
<th>N</th>
<th>Types of interventions</th>
<th>Primary Caregiver outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cooper et al. (2007)</td>
<td>SR</td>
<td>1981-2005</td>
<td>24</td>
<td>RCTs &amp; CS</td>
<td>975</td>
<td>BMT, CST, CM, Respite CBT, TBI.</td>
<td>Anxiety</td>
</tr>
<tr>
<td>Thompson et al. (2007)</td>
<td>MA</td>
<td>2003-2005</td>
<td>44</td>
<td>RCTs</td>
<td>NR</td>
<td>PEI, TBI</td>
<td>Anxiety, depression, Burden, Depression</td>
</tr>
</tbody>
</table>

*Note. k = number of studies included in the review*

SR= systematic review, MA= meta-analysis, CT= control trial, RCT= randomised control trial, CS= cohort studies, RM= repeated measures, ITS= interrupted time series, NL = not limited
MCI= multicomponent intervention, CBT= cognitive behaviour therapy, CM= case management, TBI= technological-based intervention, EDI= educational interventions, PEI= psychoeducational intervention, ST= skills training, BMT= behavioural management training, CST = coping skills training, CRI = care recipient interventions, SC = supportive counselling
<table>
<thead>
<tr>
<th>Review</th>
<th>Review type</th>
<th>Period covered</th>
<th>k</th>
<th>Type of studies</th>
<th>N</th>
<th>Types of interventions</th>
<th>Primary Caregiver outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goy et al. (2010)</td>
<td>SR</td>
<td>1985-2009</td>
<td>37</td>
<td>RCTs</td>
<td>13213</td>
<td>ST, BMT, SC, CM, MCI.</td>
<td>Depression, Anxiety, Anger, Grief, Burden, Well-being, Mental health</td>
</tr>
<tr>
<td>Chien et al. (2011)</td>
<td>MA</td>
<td>1998-2009</td>
<td>30</td>
<td>CTs &amp; RCTs</td>
<td>NR</td>
<td>All interventions, PEI, SC</td>
<td>Well-being depression, burden, Mental health</td>
</tr>
</tbody>
</table>

*Note. k = number of studies included in the review
SR= systematic review, MA= meta-analysis, CT= control trial, RCT= randomised control trial, CS= cohort studies, RM= repeated measures, ITS= interrupted time series, NL = not limited
MCI= multicomponent intervention, CBT= cognitive behaviour therapy, CM= case management, TBI= technological-based intervention, EDI= educational interventions, PEI= psychoeducational intervention, ST= skills training, BMT= behavioural management training, CST = coping skills training, CRI = care recipient interventions, SC = supportive counselling*
3.4 Intervention efficacy

Findings are presented according to the intervention type and outcome. Effect sizes were subjectively interpreted using Cohen’s (1988) threshold criteria.

3.4.1 All intervention types.

The impact of all types of caregiver interventions was examined by two reviews rated as methodologically strong. Pinquart and Sorensen (2006) found small significant effect sizes for the impact of interventions on well-being, \( d = 0.31 \), CI \([0.17, 0.44]\), depression, \( d = -0.24 \), 95% CI \([-0.33, -0.15]\), and burden, \( d = -0.12 \), 95% CI \([-0.17, -0.07]\). Statistically significant small effect sizes were also found by Chien et al. (2011) for the impact of caregiver interventions on psychological morbidity, \( g = -0.44 \), 95% CI \([-0.73, -0.15]\), and depression, \( g = -0.40 \), CI \([-0.72, -0.08]\). A non-significant effect size was found on burden of -0.23.

One review, rated as having moderately strong methodology, evaluated the impact of all caregiver interventions. Acton and Kang (2001) reported a non-significant effect size of -0.08 on burden.

One review rated as being of moderate quality assurance. Brodaty, Green and Koschera (2003) found small significant effect sizes for the impact of interventions on affect, \( d = 0.32 \), 95% CI \([0.15, 0.48]\), and psychological morbidity, \( d= 0.31 \), CI \([0.13, 0.50]\). A statistically non-significant effect size was found on burden of 0.09 (Brodaty et al., 2003).

3.4.2 Educational Interventions.

Education (EDI) and psychoeducation (PEI) are designed to increase knowledge of dementia, specialised care and support services availability (Sorensen et al., 2002).
Whilst didactic teaching methods are used in EDI, PEI involves experiential learning and active engagement in the learning process (Acton & Kang, 2001).

### 3.4.2.1 Education.

Two reviews, rated as methodologically strong, evaluated the effect of educational interventions on caregivers. Pinquart and Sorensen (2006) found non-significant effect size for the impact of educational interventions on burden, $d = -0.52$, depression, $d = -0.10$, and well-being, $d = 0.31$. A small, significant effect size for the impact of EDI on burden, $g = -0.23$, 95% CI $[-0.36, -0.10]$, was found by Chien et al. (2011). This review found no significant effect sizes for the impact of EDI on depression, $g = -0.22$, and well-being, -0.30.

The impact of educational interventions was examined by one review rated as moderately strong methodologically. Acton and Kang (2001) found that EDI had no statistically significant effect on burden, $d = -0.03$.

One review was rated as having moderate methodological rigour. None of the three EDI studies reviewed by Peacock and Forbes (2003) found a significant reduction in depression compared to minimally supportive interventions.

The impact of EDI was examined by one review rated as methodologically weak. None of the sixteen EDI studies reviewed by Selwood et al. (2007) reported significant differences in mental health, burden, stress or depression compared to control conditions or at follow up (Selwood et al., 2007).

### 3.4.2.1 Psychoeducation.

Two reviews, rated as methodologically strong, evaluated the effect of PEIs on caregivers. Psychoeducation was found by Pinquart and Sorensen (2006) to have small significant effects on burden, $d = -0.20$, CI $[-0.32, -0.07]$, well-being, $d = 0.21$, 95% CI $[0.00, 0.43]$, and depression of -0.36, 95% CI $[0.58, -0.15]$. 
Chien et al. (2011) found PEI to have a small significant effect on burden, $g = -0.23$ [-0.36, -0.10]. Significant medium effect sizes for the impact of PEI on depression, $g = -0.63$, [-1.06, -0.20], and well-being, $g = -0.62$, 95% CI [-0.99, -0.24], were found.

One review rated as moderately strong methodologically. Thompson et al. (2007) reported non-significant effect sizes for the impact of group PEI on burden, $d = -0.40$, CI [-5.69, 4.90], and individual PEI on depression, $d = -0.21$, CI [-0.61, 0.20]. A significant effect size was found for the impact of group psychoeducation on depression, $d = -0.71$, CI [-0.95, -0.46].

**3.4.3 Skills Training Interventions (ST).**

These interventions are primarily focused on increasing the skills of caregivers (Goy, Kansagara & Freeman, 2010). This group of interventions can be subdivided into interventions which focus on globally increasing skills or are tailored to dementia specific care skills or coping with the emotional impact of the role. The latter has been termed behaviour management and coping skills interventions (Selwood et al., 2007).

One review was rated as moderate methodologically. The review by Goy et al. (2010) evaluated the impact of group and individually delivered ST interventions. Of the four studies evaluating the impact of individual ST on depression, three studies found significantly greater improvements in depression compared to waiting list or minimally active control conditions at follow-up. One study reviewed by Goy et al. (2010) reported non-significant improvement in depression. A significant reduction in anger was found by one of the reviewed studies at 12 month follow up compared to a minimally supportive intervention.
Six studies reviewed by Goy et al (2010) examined the impact of group ST. Three of these reported significant improvements in depression compared to a waiting list control condition. Non-significant changes in depression were reported by three of the reviewed studies.

3.4.3.1 Behaviour management training (BMT).

BMT, a subgroup of ST interventions, is designed to increase management of the behavioural manifestations of dementia (Selwood et al., 2007). Two reviews, rated as being moderately methodological rigour, evaluated the effect of this intervention.

Of the three studies reviewed by Goy et al. (2010), two evaluated the impact of BM on depression. One study found significant improvements in depression and well-being compared to standard care. However, a non-significant difference in depression was reported by the second study evaluating this outcome. One of the reviewed studies found no significant impact of BMT on burden.

The three studies reviewed by Cooper, Balamurali, Selwood and Livingston (2007) examining the impact of BMT reported no significant improvement in anxiety post-intervention or at 6 month follow up compared to a support group or minimally active interventions.

One review was rated as methodologically weak. Selwood et al. (2007) reviewed eleven studies examining the impact of group BMT. No significant improvements were found by the seven studies evaluating the impact of BM on depression or the eight studies examining the effect on burden. One of the reviewed studies found a significant improvement in mental compared to the control condition at post-intervention. However, two studies reported non-significant effects on mental health. Non-significant reduction in anxiety was reported by one of the reviewed studies.
Selwood et al. (2007) reviews five studies evaluating the impact of individual BMT. No significant improvements were found by the three studies evaluating the impact of BMT on depression or the two studies examining the effect on stress. One of the reviewed studies reported a significant reduction in burden compared to a control condition. However, a non-significant difference was reported by one of the reviewed studies. No significant reductions in anxiety were found by the reviewed study evaluating the impact of BMT on this outcome.

**3.4.3.2 Coping skills training (CST).**

The subgroup, CST, has focused on providing adaptive strategies to manage the emotional impact of caregiving (Goy et al., 2010). One review evaluating this intervention was rated as having moderate methodological rigour. In all the studies (k=2) reported by Cooper et al. (2007), relaxation skills training significantly reduced anxiety post intervention.

One review was rated as methodologically weak. Selwood et al. (2007) reviewed five studies evaluating the impact of CST on depression. Of these, four reported significant improvements in depression compared to usual care. Thus, non-significant outcomes were reported by five studies. One of the eight reviewed studies evaluating group CST on burden found a significant improvement compared to usual care, with three studies having reported a non-significant difference in this outcome.

**3.4.4 Supportive counselling (SC).**

This has tended to be an unstructured intervention designed to create opportunities for emotional validation and support, and for group interventions, peer support (Acton & Kang, 2001).

Two were rated as methodologically strong. Pinquart and Sorensen (2006) reported a significant, effect size for impact of SC on well-being, $d = 0.42$, 95% CI
[1.36, 2.70]. Statistically non-significant effect sizes were found by this review on depression, \( d = 0.05 \), and burden, \( d = -0.40 \). Chien et al. (2011) reported the impact of SC to have statistically non-significant effect sizes on depression, \( g = 0.08 \), burden, \( g = -0.27 \), and well-being, \( g = 0.02 \).

SC was evaluated by one review rated as moderately strong methodologically. Acton and Kang found significant small effect sizes on burden for the impact of individual SC, \( d = 0.07, 95\% \text{ CI } [-0.34, -0.19] \), and group SC, \( d = 0.00, 95\% \text{ CI } [-0.54, 0.54] \).

One review, rated as having moderate methodological rigour, evaluated the effect of supportive counselling on caregivers. Goy et al. (2010) reported that one of the reviewed studies evaluated the impact of individual SC on anxiety, finding no significant immediate improvement in this outcome. No significant immediate improvements were found by the three studies evaluating the impact of individual SC on depression or the two studies examining the effect on burden compared to no intervention or minimal support.

One review, Selwood et al. (2007) was rated as methodologically weak. No significant immediate improvements were found by the four studies evaluating the impact of individual SC on depression or the three studies examining the effect on anxiety compared to no intervention or minimal support. Five of the six reviewed studies evaluating the impact of SC on burden found no significant decrease in this outcome. Selwood et al (2007) reported that one study, considered to be methodologically weak, found a significant immediate improvement in burden. Similarly, two reviewed studies found non-significant reductions in mental health compared no intervention or minimal support. However, one study, rated by Selwood
et al (2007) as methodologically weak, reported a significant reduction in mental health from baseline to intervention end.

3.4.6 Multi-component Interventions (MCI).

MCIs are derived from combining unimodal psychosocial interventions (Sorensen et al., 2002). One empirical review evaluating MCI was rated as methodologically strong. Pinquart and Sorensen (2006) found non-significant effect sizes for impact of MCI on burden, $d = -0.03$, well-being, $d = 0.30$, and depression of $-0.10$.

Three empirical reviews were rated as having moderately strong methodological rigour. Acton and Kang (2001) reported a small, significant effect size for the impact of MCIs on burden of 0.46, 95% CI [0.14, 0.78]. A significant effect size was found by Gitlin et al. (2003) on burden of $-1.40$, CI [-2.59, -0.20]. However, Gitlin et al. (2003) found a statistically non-significant effect size for the impact on depression, $d = -0.59$; 95% CI [-1.42, 0.23]. Schoenmakers et al. (2010) reported non-significant effect sizes for the impact of MCI on depression, $d = -0.03$, and burden, $d = -2.94$. The tests of heterogeneity associated with the latter was significant, $X^2 = 18.19$, df = 5 $p < 0.001$, with an $I^2$ value of 72.5 indicating a high degree of heterogeneity within the studies evaluated by Schoenmakers et al. (2010). Whilst a relatively small number of these studies considered the impact of interventions on burden, the variability in effect sizes was relatively large including both positive and negative effect sizes (Schoenmakers et al., 2010). Given the lack of homogeneity and low number of studies, the observed the effect size may have been over-estimated with insufficient power to adequately evaluate this construct.

One empirical review evaluating MCI was rated as having moderate quality assurance. Goy et al. (2010) reported that one of the two reviewed studies examined
the impact of a MCI found a significant reduction in depression compared to an information condition. The second study found that no significant improvement in depression when the MCI was compared to standard care. Significant improvements were reported by the one study reviewing the impact of MCI on burden and the one study examining the impact of MCI on well-being compared to minimally active intervention conditions. A non-significant reduction in anxiety was found by one study comparing the impact of MCI to standard care. Goy et al (2010) reviewed one study examining the preventative impact of MCI on grief, with significant reductions reported in the symptoms of grief after the death of the care recipient.

3.4.7 Cognitive behaviour therapy (CBT).

CBT approaches include the modification of maladaptive beliefs and behavioural responses to caregiving (Pinquart & Sorensen, 2006; McCurry, Logsdon, Vitiello & Teri, 1998).

One review was rated as methodologically strong. Significant effect sizes for the impact of CBT on burden, $d = -0.36$, 95% CI [-0.73, -0.01], and depression, -0.70, [-1.10, -0.30], were reported by Pinquart and Sorensen (2006). However, this meta-analysis reported a non-significant effect on well-being, $d = 0.37$, CI [-0.23, 1.62].

One empirical review was rated as having moderate methodological rigour. Cooper et al. (2007) reported that one of the three reviewed studies found group CBT to have a significant immediate improvement on anxiety. Thus, two reviewed studies reported that group CBT had non-significant improvements in anxiety post-intervention and at six month follow-up.
4.0 Discussion

4.1 The impact of caregiver interventions

Overall, caregiver interventions had small to moderate significant effects on well-being, distress, depression and mental health (Chien et al., 2011; Pinquart & Sorensen, 2006). However, consideration of intervention subtypes is important given between group heterogeneity and the variability in outcome.

4.1.1 Educational interventions.

Whilst non-significant outcomes were established for EDI, the effects of PEI on depression, well-being, mental health or stress were statistical significance (Acton & Kang, 2001; Chien et al., 2011; Peacock and Forbes, 2003; Pinquart & Sorensen, 2006; Selwood et al., 2007; Thompson et al., 2007). Therefore, PEI is more effective than EDI in ameliorating caregiver distress than educational interventions. The primary difference between these interventions is the way in which the information is delivered. Whilst EDI uses a didactic approach, PEI incorporates active and experiential learning (Acton & Kang, 2001). Losada et al. (2008) suggested that the latter may be required for caregivers to have the opportunity to modify dysfunctional thoughts. This may be important as the appraisals of caregiving may negatively impact on adaptive coping (Losada et al., 2008).

4.1.2 Skills training (ST).

When considered as a global group of interventions, ST interventions were found to have had non-significant improvements on caregiver depression and anger (Goy et al., 2010). However, ST interventions do not represent a homogeneous group of interventions, representing instead two distinct types, namely behavioural management and coping skills training. However, evaluating the interventions separately provided limited evidence for the impact of these interventions.
In particular, moderate evidence was established to suggest that BM had no significant impact on burden, depression or anxiety (Cooper et al., 2007; Goy et al., 2010; Selwood et al., 2007). Findings were consistent for individual and group BM (Selwood et al., 2007). However, given these interventions are designed to increase care skills, the impact on the psychological well-being of caregivers may be a secondary gain. Subsequently, the effect sizes would be expected to be smaller and this intervention may have positive and negative effects if a balance between the caregivers and care recipients’ needs are not adequately met.

For CST, a significant effect on anxiety was only found when the intervention goal was assisting caregivers in managing anxiety (Cooper et al., 2007). However, overall CST did not significantly improve caregiver depression or burden (Selwood et al., 2007).

The lack of improvement facilitated by ST interventions may reflect poor consideration of the match between the needs of the caregiver and the intervention goals. Caregivers may be engaging in interventions that are not appropriate given the particular difficulties they experienced as a result of the role. For instance, behavioural management interventions have not tended to be tailored difficulties associated with particular types of dementia. Similarly, the lack of matching need with intervention may introduce the possibility that caregiver participants may engage in interventions focused on coping skills when the role is not associated with negative emotions. Furthermore, the quality of the reviews may have contributed to these findings as the reviews evaluating BMT and CST are less methodologically rigorous than the reviews considering other intervention types.
4.1.3 **Supportive counselling (SC).**

Overall, SC had no significant impact on caregiver depression, burden and anxiety (Chien et al., 2011; Goy et al., 2010; Pinquart & Sorensen, 2006). Acton and Kang (2001) reported a small positive effect on burden, suggesting that SC may have a detrimental effect for caregivers. The findings appear to suggest that SC may improve caregiver’s subjective well-being. However, only the outcomes of one of the two meta-analyses reached significance (Chien et al., 2011; Pinquart & Sorensen, 2006). However, the specific approach used within SC has often been poorly defined within the literature and has tended to represent a heterogeneous group of interventions. For instance, it has referred to both unstructured peer support and person centred individual counselling. It is unlikely that the mechanisms of change will be similar within this group of interventions. The lack of significant outcomes could be attributed to the different effects of these interventions.

4.1.6 **Multicomponent interventions.**

Overall, MCIs had a significant effect on burden, but not depression or well-being (Acton & Kang, 2001; Gitlin et al., 2003; Goy et al., 2010; Pinquart & Sorensen, 2006; Schoenmakers et al., 2010). Inconsistencies were noted in the outcomes, particularly burden. This may be attributed to MCIs not representing a homogenous intervention group with large variation observed in the nature of these interventions. However, little consideration has been given to the differential effects of MCIs according to differences in the constituent components.

4.1.7 **Cognitive behaviour therapy**

The findings indicate that CBT is effective in improving caregiver depression and burden, but not well-being or anxiety (Cooper et al., 2007; Pinquart & Sorensen, 2006).
More positive outcomes may have been expected for anxiety as CBT is widely used to alleviate the symptoms of a range of anxiety disorders in the general population (Hunot, Churchill, de Lima & Teixeira, 2007). However, few studies were considered in the evaluation which may limit the interpretative accuracy of these findings.

4.2 Revisiting methodological criticisms proposed by Knight et al. (1993)

A number of interventions, namely psychoeducation, CBT and multicomponent interventions appear to hold the promise of alleviating caregiver distress across a range of challenges associated with caregiving (Chien et al., 2011; Pinquart & Sorensen, 2006). The most prominent effects, however, were found with CBT, reflecting the suggestion that interventions required a broad focus incorporating a range of approaches to adequately address the continuously fluctuating needs of caregivers and care recipients (Hinchliff et al., 1995; Zarit et al., 1996). However, inconsistencies and methodological flaws remain apparent in the finding of caregiver intervention studies.

4.2.1 Methodological Clarity.

Consistently across early and more recent intervention studies, the accounts of the methodology have been criticised as lacking detail. Specifically, the reporting of the sampling methods, intervention conditions, attrition rates and the processes of allocation to condition and blinding has been insufficiently detailed (Gitlin et al., 2003; Goy et al., 2010; Knight et al., 1993; Peacock & Forbes, 2003; Schoenmakers et al., 2010; Thompson et al., 2007). This lack of clarity in the procedures limits the ability to replicate interventions studies and may introduce inaccuracies in the classification of interventions in empirical reviews.
4.2.2 Sample selection and allocation.

Early research studies were criticised for failing to consider the representativeness of caregiver samples with studies tending to recruit a small subset of the population of caregivers who were accessing supportive services (Gallagher-Thompson et al., 2003; Grossfeld-Schmitz et al., 2010; Knight et al., 1993; Robinson et al., 2005).

Whilst attempts have been made to recruit caregivers from different ethnic backgrounds, biases remain in caregiver samples (Acton & Kang, 2001; Brodaty et al., 2003; Gitlin et al., 2003; Pinquart & Sorensen, 2006). Despite an awareness of these biases, intervention and review analyses have not adequately considered the impact of sample characteristics and access to services on outcome (Chien et al., 2011; Gitlin et al., 2003; Goy et al., 2010; Lee & Cameron, 2008; Pinquart & Sorensen, 2006; Schoenmakers et al., 2010; Selwood et al., 2007). Study outcomes are, therefore, only be applicable to this subpopulation of caregivers.

Overall, sample sizes tend to be relatively small, with few large scale research studies being undertaken (Gitlin et al., 2003; Goy et al., 2010; Pusey & Richards, 2001; Selwood et al., 2007; Thompson et al., 2007). This may limit the ability of studies to detect modest effects as studies may have relatively low power (Brodaty et al., 2003; Chien et al., 2011; Cooper et al., 2007). This may be particularly problematic as until recently researchers had not undertaken a priori calculations of power and sample size (Goy et al., 2010).

4.2.3 Intervention design.

The early interventions were criticised for a lack of theoretical ground (Knight et al., 1993; Selwood et al., 2007). However, recent research has place an emphasis on theory-based intervention design (Chien et al., 2011).
The design was also criticised for a lack of tailoring to the specific needs of caregiver subpopulations (Knight et al., 1993). A range of interpersonal and care contextual variables are known to contribute to the experience of caregiver distress (Knight & Sayegh, 2010; Pearlin et al., 1990; Pinquart & Sorensen, 2011).

Increasingly interventions have been designed to be sensitive to caregiver ethnicity and according to the type of dementia experienced by the care recipient (Gitlin et al., 2003). However, interventions have not tended to have been tailor to meet the needs of other caregiver subpopulation or according to the stage of disease progression (Chien et al., 2011; Goy et al., 2010; Schoenmakers et al., 2010). Additional research is required to consider intervention sensitive to the caregiver’s age and history of service use (Knight & Sayegh, 2010; Pearlin et al., 1990; Pinquart & Sorensen, 2011; Robinson et al., 2005).

Developing age sensitive intervention may be particularly important given recent findings suggesting the emotional experiences of older and working adults differs (Carstensen et al., 2011). Thus, the experience of caregiver distress may differ according to the age of the caregiver. Furthermore, the method of intervention delivery has been found to vary across intervention types (Gitlin et al., 2003; Goy et al., 2010; Lee & Cameron, 2008; Pinquart & Sorensen, 2006). However, the research has not adequately considered the impact of intervention characteristics on outcomes (Knight et al., 1993; Pinquart & Sorensen, 2006; Pusey & Richards, 2001; Schoenmakers et al., 2010).
4.2.4 Data collection.

A broad range of measures have been utilised within intervention studies across the last 30 years (Pinquart & Sorensen, 2006). It was suggested that grounding of interventions in theory should increase the specificity of outcomes and the selection of appropriate measures (Schulz et al., 1989). However, clear rationales have not consistently been provided for the evaluation of particular outcomes (Pinquart & Sorensen, 2006). Difficulties have also arisen in the long term evaluation of outcomes, such as burden, which are relatively insensitive to change (Cooke et al., 2001; Knight et al., 1993). The evaluation of burden is particularly problematic as the differential effect of subject and objective burden have not been examined (Braithwaite, 1992; Montgomery, Gonyea & Hooyman, 1985). The effects of interventions which evoke change in one of these burden types with minimal effect on the other may not be detected when a global measure of burden is used.

Data collection has been reliant on the use of self report measures (Pusey & Richards, 2001; Thompson et al., 2007). The measures selected have not always been the most appropriate, reliable or sensitive to change (Acton & Kang, 2001; Gallagher-Thompson et al., 2000; Peacock & Forbes, 2003). Self report measures have also been subject to ceiling or floor effects and may mask intervention effects (Pusey & Richards, 2001; Schoenmakers et al., 2010).

Consideration of the impact of caregiver characteristics has been insufficient in research studies and reviews. Little consideration has been given to engagement with community and health services (Schoenmakers et al., 2010). However, this limits the ability to attribute study effects to the intervention. The data collection period has tended to be relatively brief (Pinquart & Sorensen, 2006).
The introduction of longer follow up periods would be particularly significant given the fluctuations in caregiver distress across the disease progression.

**4.2.5 Data analysis and outcome reporting.**

Inaccuracies in data analysis and outcome reporting have been highlighted in the recent reviews that were not previously considered. For instance, intent-to-treat analyses have not tended to have been undertaken (Goy et al., 2010; Thompson et al., 2007). This introduces the possibility of biases in condition comparisons. In addition, Thompson et al. (2007) indicated that post-hoc analyses have been inappropriate used when no main effect has been established. The analyses have also been focused on determining statistically significant change, without consideration of the clinical significance or tangibility of these effects on the life of the caregiver (Burgio et al., 2008; Goy et al., 2010; Schulz et al., 2002; Thompson et al., 2007).

Imprecision has been noted in the outcome reporting, with some studies failing to provide the specific figures for non-significant findings (Thompson et al., 2007). This limits the quantitative assimilation of findings as insufficient information would be available to calculate effect sizes.

**4.3 Limitations in the reviews.**

Methodological flaws in the primary research have directly impact the quality of the synthesis of outcome data in empirical reviews. The lack of clarity in the descriptions of intervention design and theoretical grounding has increased difficulties in classifying intervention types (Chien et al., 2011; Goy et al., 2010; Selwood et al., 2007). Overlap in intervention classification was noticed between the included reviews. Allocation discrepancies may distort the significance of outcomes as the data is inter-correlated.
These difficulties are likely to have been compounded in this review when intervention subcategories were combined, particularly as reviews have not tended to describe intervention categories. A standardised classification system is needed.

A more accurate evaluation of Knight et al.’s (1993) criticisms would have been achieved by reviewing primary studies. This was restricted by the vast quantity of research. However, difficulties were established amalgamating the outcome data given that the outcome data from systematic and meta-analytic reviews are fundamentally different. The data collated from the systematic reviews was particularly difficult to synthesis given the imprecision of outcome reporting. The inconsistencies across the intervention outcomes made it difficult to derive an accurate sense of the data.

Biases may have been introduced in the assessment of review methodology as a standardised generic quality assurance measure was not used. The reliability and validity of the QA measure is, therefore, unknown. However, standardised measures have been found to introduce bias as the scales use place arbitrary ‘weights’ on the methodological components being evaluated (Jüni, Witschi, Bloch & Egger, 1999). The QA measure was specifically tailored to the methodological weakness identified by Knight et al. (1993). The use of a domain-based measure allowed methodological components to be weighted according to the design and goals of the study (Higgins & Green, 2011). However, this may have reduced the clarity of decisions made about the methodological quality of a review.

Consideration of intervention studies conducted after 2009 would be warranted in future given recent consideration of other approaches, such as mindfulness and acceptance and commitment therapy (Losada & Marquez-González, 2011; Oken et al., 2010). This was not within the scope of this review.
4.4 Clinical Implications

The impact of dementia on families is substantial. Interventions for caregivers may not only prevent or alleviate the distress of caregivers, but indirectly increase the psychological well-being of the individual with dementia and reduce the occurrence of harmful care practices (Cooper et al., 2007; Gitlin, Winter, Dennis, Hodgson & Hauck, 2010; Mittelman, Haley, Clay & Roth, 2006; Teri et al., 2003; Wang, Lin, Tseng & Chang, 2009).

Service provision for dementia caregivers has been variable and has been provided across health, social and voluntary sectors (Knapp et al., 2007). Whilst further research is warranted, the research would seem to suggest that services need to develop a structured, integrated approach which is sensitive to the unique needs of caregiver (Chien et al., 2011; Knight et al., 1993). Given the complexity and fluidity of the caregiver role, this is not likely to represent one intervention but a series of multicomponent interventions delivered at particular time points across the period of care provision. These interventions are required to provide opportunities for caregivers to challenge preconceived and maladaptive beliefs about dementia and consolidate skills through experiential or applied learning (Losada, Montorio, Knight, Marquez & Izal 2006). As caregivers who are not accessing services may be experiencing the greatest distress, greater consideration needs to be given to facilitating access to services.

4.5 Summary

Whilst inconsistencies exist in the findings, sufficient evidence has been established to suggest caregiver interventions overall are effective in alleviating caregiver distress. The interpretative reliability of the research is limited by methodological flaws in intervention studies.
Whilst some improvement has been noted in the quality of research, greater consideration is needed of potential sources of bias or inaccuracy. There is a need for high quality research to evaluate the mechanisms that facilitate positive changes for caregivers across all stages of the disease progression. This may be aided by greater specificity in intervention design and consideration of care contextual factors which may limit positive gain.
References


META-ANALYSIS

Efficacy of Cognitive Behaviour Therapy for Dementia Caregivers

Aims
Hypotheses
Methodology
Results
Discussion
Aims and Hypotheses

1.1 Aims

A number of research studies have investigated the impact of cognitive behaviour therapy (CBT) on the psychological well-being of caregivers. The effects of this intervention have not been the primary focus of an empirical review. As such, this review will use meta-analytic techniques to systematically evaluate the efficaciousness of CBT for informal dementia caregivers.

1.2 Hypotheses

Cognitive behaviour therapy will have a significantly larger effect on caregiver depression, burden, mental health, adaptive coping and dysfunctional thoughts about caregiving than a minimal supportive intervention.

Caregiver gender will significantly predict the outcome of cognitive behaviour therapy. Specifically, intervention studies with a higher percentage of female caregivers will have significantly larger effects on depression, burden, mental health, adaptive coping and dysfunctional.

The type of relationship between caregiver and care recipients will significantly predict the impact of cognitive behaviour therapy on caregiver depression, burden, mental health, adaptive coping and dysfunctional thoughts. Specifically, it is hypothesised that interventions studies with higher percentage of spouse caregivers and lower percentage of adult child caregivers will have significantly larger effects on these outcomes.
1.2 Hypotheses

The ethnic background of the caregiver will significantly predict the impact of cognitive behaviour therapy on caregiver outcomes. Intervention studies with a higher percentage of caregivers of Caucasian ethnicity will have significantly larger effects on depression, burden, mental health, adaptive coping and dysfunctional thoughts.

The length of time a caregiver has provided care to an individual with dementia will significantly predict the impact of cognitive behavioural therapy. Specifically it is hypothesised that larger effect sizes for cognitive behaviour therapy on depression, burden, mental health, adaptive coping and dysfunctional thoughts will be found for caregivers who have cared for a shorter amount of time, 30 to 36 months and 37 to 43 months, compared to caregivers who have cared for longer, 44 to 49, 50 to 56, 57 to 63, and 64 to 69 months.

Intervention studies delivering cognitive behaviour therapy over a greater number of sessions and hours will have larger effects on caregiver depression, burden, mental health, adaptive coping and dysfunctional thoughts than studies with a shorter delivery duration.

Intervention studies delivering cognitive behaviour therapy to caregiver of an individual with Alzheimer’s disease will have larger effects on caregiver depression, burden, mental health, adaptive coping and dysfunctional thoughts than studies delivering CBT to caregiver of an individual with a range of different types of dementia.
1.2 Hypotheses

Intervention studies delivering cognitive behaviour therapy using a range of mediums will have larger effects on caregiver depression, burden, mental health, adaptive coping and dysfunctional thoughts than individual, group or technology-based delivery methods.

Larger effects on caregiver depression, burden, mental health, adaptive coping and dysfunctional thoughts are predicted for intervention studies comparing cognitive behaviour therapy to wait list control groups than those comparing CBT to minimally supportive interventions or usual care.
2.0 Methodology

2.1 Search Protocol

A predefined search process for cognitive behavioural intervention studies was developed based on the methods outlined within the Cochrane handbook for systematic reviews (Higgins & Green, 2011) and by Fields and Gillett (2010). These recommend that clarity be sought over the nature and purpose of the review prior to the review process starting (Higgins & Green, 2011). Detailed eligibility criteria for study inclusion were developed, with the types of participants, interventions, outcomes and study methodology outlined (Higgins & Green, 2011). The process that would be used during the search was classified, with consideration given to the assessment and management of biases (Field & Gillett, 2010). These guidelines recommended that a data extraction form be developed and methods of analyses are considered at the start of the review process (Field & Gillett, 2010; Higgins & Green, 2011). This protocol also detailed ways of managing potential difficulties, such as heterogeneity and publication biases (Field & Gillett, 2010).

A number of searches of electronic databases were conducted, according to the criteria outlined to identify relevant literature. Relevance was determined against an established set of inclusion criteria. Further studies were identified from a hand search of the reference lists of identified studies and of journals relevant to gerontology or dementia. When insufficient information was available to determine whether studies would meet inclusion criteria, additional information was sought from other study publications, where relevant. No publication date limitations were placed on the studies.
2.2 **Inclusion Criteria**

2.2.1 **Participants.**

Participants were adults, over the age of 18, identifying themselves as the primary caregivers who provide informal, unpaid care to an individual with a formal diagnosis with dementia. Caregivers of an individual with mild cognitive impairment, stroke or other physical impairments were not included. Given fundamental differences in functioning, intervention studies focused on caregivers of individuals with Parkinson’s disease were also excluded (Schrag et al., 2006). Care was required to be provided in the community. The nature of the relationship between caregiver and care recipient was not limited to a familial bond. Caregivers would, therefore, be considered who provide care for an acquaintance or partner.

2.2.2 **Interventions.**

Caregiver interventions were restricted to those grounded in cognitive behaviour theory (Beck, 1987; Beck *et al.*, 1979; Laidlaw *et al.*, 2003). CBT is defined as a structured, time-limited approach that seeks to alleviate psychological distress through the application of cognitive and behavioural techniques (Laidlaw *et al.*, 2003). These include psychoeducation, activity scheduling, management of physiological arousal, graded task assignment, problem solving techniques, and the identification, monitoring and challenging of beliefs and assumptions (Gallagher-Thompson & Steffen, 1994). CBT for caregivers may also feature, as a core component, the development of behavioural management strategies to manage caregiving (Pinquart & Sørensen, 2006).
2.2.3 Outcome Foci.

A wide range of quantitative caregiver and care recipient outcomes have been evaluated within intervention studies (Van Houtven et al., 2011). Knowledge of dementia and caregiver satisfaction with the intervention has not been found to be associated with amelioration of caregiver distress (Haley et al., 1987; Kurz et al., 2010). As such, these were not considered within this review.

Caregiver burden and depression are the most commonly evaluated variables and were, therefore, included in the review (Gallagher & Coon, 2007). Caregiver mental health was considered. This variable included measures of psychological morbidity and well-being, such as subjective well-being, anxiety, stress, strain, and anger.

Dysfunctional thoughts and coping were considered, because of the central role of these variables in the cognitive behavioural model (Losada et al., 2006). Adaptive coping included measure of coping, support access, leisure time satisfaction, and support satisfaction. This is not an exhaustive list.

2.2.4 Study Methodologies.

The quality of the caregiver intervention studies has been widely criticised as being methodologically poor (Chien et al., 2011; Knight et al., 1993; Pinquart & Sorensen, 2006). As such, study type was limited to randomised control trials, which have been associated with greater methodological quality (Chien et al., 2011). The meta-analysis by Sorensen et al. (2002) evaluated the impact of caregiver interventions compared to a minimally active control condition. This limit was set to reduce the possibility of intervention effects being under-estimated and to provide a comparison with standard interventions (Pinquart & Sorensen, 2006). In order to compare the outcomes with other empirical reviews, the same approach was used,
with control conditions limited to waiting list, usual care or minimal support conditions. Studies written in English were included in the review. For the purpose of the analysis, only studies that reported statistical analytical data that could be converted into size effects were included in this meta-analysis.

2.3 Search Methods

Electronic databases, namely MEDLINE, Embase, CINAHL, PsycINFO, Psychology and Behavioral Sciences Collection, and The Cochrane Library, were searched in June 2011. The search was updated in November 2011. The search terms were caregv*or carer, and dement* or Alzheimer’s disease, and cogniti* behave* therapy, cogniti* behav* intervention, family cogniti* behav* therapy, or psychoeducation. Asterisks were used as it allowed the identification of all relevant truncated words.

Additional studies were indentified by cross-referencing and hand searching journals that have been highlighted by existing systematic reviews as sources of frequently published intervention studies or relevant to the area. These included The Gerontologist, the Journals of Gerontology, Journal of Gerontological Social Work, Journal of Gerontological Nursing, Journal of nursing research, Psychology and Aging, and Aging and Mental Health (Knight et al., 1993; Pinquart & Sorensen, 2003 & 2006).

2.4 Assessment of methodological quality

The methodological quality of the intervention studies was evaluated. Standardised measures of study quality, such as the Delphi list, have a generic nature, designed to be applied to a range of studies (Verhagen et al., 1998). The areas generally considered to be methodological weaknesses within caregiver intervention studies were not adequately evaluated by these tools.
These quality assurance (QA) scales were, therefore, not utilised. An amalgamated set of standards was developed based on the methodological criticisms of caregiver intervention studies and existing guidelines (e.g. Centre of Reviews & Dissemination [CRD], 2009; Higgins & Green, 2011; Knight et al., 1993; Scottish Intercollegiate Guideline Network [SIGN], 2008).

The amalgamated measure did not use a quantitative scoring system as this has been found to increase the risk of bias (Higgins & Green, 2011). These scales place arbitrary ‘weights’ on particular aspects of study methodology, with no consideration for differences across study designs or aims (Higgins & Green, 2011). Consistent with the recommendations of Higgins and Green (2011), the QA tool used was developed from domain based criteria. The nature of each domain was predefined and was weighted according to the risk of bias may be introduced based on the study design.

2.5 Data Extraction

To ensure that all the required data were extracted from the studies a data extraction form was developed. This was used to reduce the risk of sampling errors (CRD, 2009). Intervention, caregiver and care recipient characteristics were extracted and summarised, as follows: -

Intervention characteristics included the year of publication, the delivery method, and length and duration of the intervention.

Caregiver characteristics included relationship with care recipients, age, gender, ethnicity, years in education, and length and amount of caregiving.
Care recipient characteristics included the nature of the dementia diagnosis. Only classification terms utilised within the Diagnostic and Statistical Manual of Mental Disorders - fourth edition, and the International Classification of Disease-tenth edition were accepted (American Psychiatric Association [APA], 2000; World Health Organisation [WHO], 1992).

2.6 Statistical synthesis of the findings

2.6.1 Analysis of the impact of CBT

Meta-analytic methods established by Hedge and Olkin (1985) were utilised to convert reported statistics into standardised effects sizes. This was based on the random effects model, which considers within- and between- study variance (Ellis, 2010). As this method produces a conservative estimate of the population effect size, it is the preferred approach when the variability is not solely attributed to subject sampling error or when all sources of heterogeneity are not known (Lipsey & Wilson, 2001). Unlike the fixed effects model, the inferences drawn can be extended beyond the sample to the wider population (DeCoster, 2009; Ellis, 2010).

Single caregiver intervention studies reported a range of outcomes, reflecting the broad impact of caregiving (Knight et al., 1993). Multiple study effect sizes were, therefore, calculated according to the outcome variable. A pooled effect size, hedge’s g, was calculated for each outcome variable (Hedges, 1981). Hedge’s g delineates the difference in post-intervention means of intervention and control groups divided by the pooled, weighted standard deviation of the conditions (Hedges, 1981). A more reliable estimate of the population standard deviation is, therefore, obtained when differences exist in samples across conditions as a more reliable estimate (DeCoster, 2009; Ellis, 2010). Recruitment and attenuation have been particular difficulties in the caregiver population. Sampling biases have also resulted in significant baseline
differences in caregiver intervention studies, despite the use of randomised allocation to condition (Brodaty et al., 2005; Chien et al., 2011; Knight et al., 1993; Schoenmakers et al., 2010). Raw effect sizes were adjusted, using the following equation, to account for these differences in pre-intervention scores, where possible (Hedges & Olkin, 1985).

\[
g_{\text{adjusted}} = \left( \frac{(X_{\text{post.e}} - X_{\text{post.c}})}{S_x} \right) - \left( \frac{(X_{\text{pre.e}} - X_{\text{pre.c}})}{S_x} \right)
\]

Caregiver intervention studies have not tended to evaluate outcomes immediately after the intervention (Chien et al., 2011). Effect sizes were, therefore, only calculated for post-intervention outcomes.

The comprehensive meta-analysis software version 2 (Biostat) was used to calculate effect sizes. Hedge’s g was adjusted, using the formula below, to correct for a natural bias found in the raw effect size when sample sizes are small (DeCoster, 2009).

\[
g^* = g \left( 1 - \frac{3}{4(n_e + n_c) - 9} \right)
\]

The estimate of population effect size may also be misrepresented when the impact of the study sample sizes are not considered (Cooper & Hedges, 1994). Raw effect sizes were, subsequently, weighted according to sample size.

Outcome dependency was a difficulty given that studies often use multiple measures to evaluate a single construct or drawn comparisons between two interventions and a single control group. Effect sizes may be less reliable when interrelated outcomes are combined. Use of Rosenthal and Rubin’s (1986) equation to combine effect sizes is the recommended method of overcoming this difficulty. However, this is reliant on the inter-correlation between responses being reported by
the studies (DeCoster, 2009). However, this is not typically reported. As such, multiple calculation were undertaken to determine estimates of the effect size. This included calculating the average and pooled effect sizes of dependent outcomes, controlling for within-study variance, and using these to calculate the estimated variable population effect size. In addition, variable effect sizes were calculating using each of the dependent outcomes separately. The most modest effect was selected to reduce the risk of over-estimating the population effect size.

2.6.2 Test of homogeneity.

A test of heterogeneity was conducted to determine whether the effects indicated true differences in the results or were attributable to chance (Higgins et al., 2003). Cochran’s $Q$, which sums the weighted squared standard deviations for each study from the overall estimate, was calculated (Higgins et al., 2003). The significance of the outcome is interpreted from the p-value. Whilst this method is commonly used, Higgins et al. (2003) noted that Cochran’s $Q$ has low power to detect significance when a small number of studies are included in a meta-analysis. As such, a non-significant result cannot be interpreted as evidence of homogeneity when this occurs (Higgins et al., 2002; Sterne & Egger, 2001; Paul & Donner, 1992). In addition, a degree of heterogeneity may be expected in reviews given the diversity in study methodology and within the caregiver population (Higgins et al., 2002; Pinquart & Sorensen, 2011). Therefore, the $I^2$- value was also calculated. This value indicates the percentage of variance attributable to heterogeneity rather than chance. Zero indicates no observed heterogeneity. Higgins et al. (2003) tentatively suggested that $I^2$- values of 25 per cent and below indicated low heterogeneity, values around 50 per cent indicate moderate heterogeneity, and greater than 75 per cent representing high heterogeneity.
2.6.3 Analysis of publication bias.

Selectivity in research publication has been suggested to create an additional bias in empirical reviews. The likelihood that statistically significant findings or studies with larger effect sizes will be published is greater (Coursel & Wagner, 1986; Lipsey & Wilson, 1993). This could lead to inaccurate estimates of population effects (Ellis, 2010). Publication biases were assessed for each of the outcome variables using funnel plots of the precision of effect size estimates. In the absence of bias, this scatter plot will be symmetrical (Ellis, 2010). Availability bias is revealed when the plot is asymmetrical and skewed on one side of the mean. Given that smaller studies are less likely to be published, asymmetry tends to be on the bottom on the plot on either the left or right side (Duval & Tweedie, 2000).

Duval and Tweedie’s (2000) trim and fill was used to provide an estimate of the potential effect sizes accounting for publication bias. Based on simple rank data augmentation techniques, this method involves the removal of outlying findings from the funnel plot to estimate from the remaining outcomes the plot’s centre. The missing outcomes are plotted to create symmetry, with estimates calculated from this plot of the true mean and variance (Duval & Tweedie, 2000).

2.6.4 Meta-regression and Subgroup analysis.

A number of variables have been identified or suggested in existing empirical reviews to influence the impact of the intervention (Chien et al., 2011; Pinquart & Sorensen, 2006). These have included caregiver and intervention characteristics, such as the method of delivery and intervention duration, and caregiver’s gender and relationship to the care recipient (Chien et al., 2011; Pinquart & Sorensen, 2011). Analyses were, therefore, undertaken to evaluate the impact of these variables on the effects of cognitive behaviour therapy. Between group differences in the effect sizes
were analysed for categorical data using a method based on analysis of variance (Borenstein et al., 2009). For continuous data, meta-regressional analyses were undertaken. This is a method based on simple regression using the random effects model. Effects were required to be weighted according to sample size. These calculations were undertaken using the comprehensive meta-analysis software.

2.6.5 Interpretation of effects.

The practical significance of the effects sizes have tended to be interpreted using the threshold criteria developed by Cohen (1988), with the effect size values of 0.2, 0.5 and 0.8 denoting small, moderate and large effect sizes. However, this method has been criticised as less reliable given the arbitrary nature of the cut-off values (Thompson, 2008). As such, the effects sizes were transformed into common language effect size, using the method developed by Dunlap (1994). The common language effect size (CLES) transforms the effect into a probability, specifically the probability that a randomly selected participant from the intervention condition will have higher outcome score than a randomly selected control participant (Ledesma et al., 2009).
3.0 Results

3.1 Search Process

The search retrieved 5175 articles, see figure 1. This included 3866 studies from seven electronic databases and 1309 from hand searches of journal articles and references lists. Details in the titles and abstracts revealed that 97 per cent of identified published articles did not meet the inclusion criteria. The excluded studies were unrelated to interventions for informal caregivers who support an individual with dementia or utilised review or qualitative methodology. After excluding duplicates, copies of the remaining studies, 106 papers in total, were accessed and reviewed against the criteria.

Of these studies, 43 were excluded as the intervention was not grounded in cognitive behavioural theory (e.g. Bormann et al., 2009). This included studies based on a psychoeducational approach that had a clear behavioural but not cognitive component (e.g. Gavrilova et al., 2009; Hepburn, et al., 2007; Mahoney et al., 2003). A further seven studies did not meet the inclusion criteria for participant type. These were excluded as the caregivers were not caring for an individual with dementia or care recipients were in a long term care placement (e.g. Ducharme et al., 2005; Sullivan & O’Conor, 2001; Vedhara et al., 2003). In total, 21 studies were excluded as a randomised control method had not been used (e.g. Williams et al., 2010). The remaining studies were excluded as the measures of change were not consistent with the review protocol (e.g. Chee et al., 2007; Wilz et al., 2011).
3.2 Assessment of Methodological Quality

The remaining 16 studies were evaluated for methodological quality. No study was identified as having no methodological weaknesses. However, the methods used by two of the studies were considered to be sufficiently poor to warrant exclusion.

Whilst this was one of the earliest studies to evaluate the impact to consider cognitive behaviour therapy as an intervention for caregivers, a number of flaws were identified in the research by Chang (1999). The experimental condition was described as cognitive behavioural therapy. However, the description of the experimental condition would suggest that the intervention was primarily behavioural focused. Cognitive components of the intervention were denoted as the provision of knowledge relating to the nature of dementia and the development of problem solving skills. However, the provision of knowledge has been established as sufficient to adequately challenge dysfunctional thoughts (Losada et al., 2006; Pinquart & Sorensen, 2006).
Psychoeducation is a component of CBT. This intervention does not consistently incorporate all components of the cognitive behavioural model. Further difficulties were noted as little detail was provided of the participant allocation processes, delivery consistency and exposure were not considered and intent-to-treat analyses were not completed. The latter would have been particularly important given that significant differences were established between caregivers completing and discontinuing participation in the study.

The study by Beauchamp et al. (2005) was also excluded from the review. This study evaluated the impact of a multimedia, multicomponent psychoeducational intervention delivered using the internet. The intervention was made available for caregivers to access at any time as frequently as was considered useful by the caregiver. However, no consideration was taken within the data analysis of exposure to the intervention in terms of time or consistency of delivery. If all of the components of the intervention were not accessed, the intervention received may not be consistent with the principles of CBT. Whilst access was not considered in the outcome analysis, Beauchamp et al (2005) indicated that the majority of caregivers, 60 per cent, accessed the intervention once. The average length of time viewing the intervention was 32 minutes, with a range of 1 to 368 minutes. Exposure to the intervention varied greatly. Furthermore, little consideration was given to the characteristics of the caregivers. Given that caregivers with employment were the focus of this study, it is likely that the participants represented a specific subpopulation of caregivers.

Gallagher-Thompson et al. (2010) also used technology based delivery, using DVD and bibliotherapy. Although exposure to the DVD was also not directly controlled, this was a guided self-help approach with therapists telephone support. This would have permitted difficulties with engagement to have been addressed.
Although the access to the intervention was a primary concern, additional difficulties were identified with the methodological quality of the study by Beauchamp et al. (2005). For instance, the process of allocation and randomisation were not described in detail, limiting judgements that could be made about the rigour of these. Significant baseline differences were observed but inconsistently controlled during data analysis. Within group analyses were undertaken, when no between group statistical significant outcomes were established. Given that the direction of change was similar for control and intervention groups on the majority of the outcomes, this may have distorted the significance of these findings.

Given the number of methodological concerns with these studies and the potential that caregivers were not participating in CBT, the studies by Beauchamp et al. (2005) and Chang (1999) were excluded.

The evaluation of research quality highlighted a number of weaknesses in the included studies, see table 1. Descriptions of methodology often lacked detail, specifically relating to allocation procedures. Few studies explicitly reported that a prior power calculations or intent-to-treat analyses had been undertaken. A number of the studies, e.g. Glueckauf et al. (2007), Marriott et al. (2000) and Steffen (2000), had small sample sizes which may have limited the ability to detect small changes. However, the majority of studies utilised measures to ensure the consistency of delivery in the intervention. Belle et al. (2006) was the only study to monitor for potentially aversive effects of the intervention on the caregiver.
### Table 1
Summary of the outcome of the intervention study quality evaluation

<table>
<thead>
<tr>
<th>Study</th>
<th>Suitable detail in method</th>
<th>Quality of Measures</th>
<th>Suitable Power</th>
<th>Randomisation Processes</th>
<th>Consistent delivery of int. ensured</th>
<th>Blinding</th>
<th>Analysis</th>
<th>Outcome reporting bias</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Belle et al. (2006)</td>
<td>Y</td>
<td>Y+2</td>
<td>Y7</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y10</td>
</tr>
<tr>
<td>Au et al. (2010)</td>
<td>Y</td>
<td>Y</td>
<td>Y7</td>
<td>UC</td>
<td>UC</td>
<td>UC</td>
<td>Y</td>
<td>Y11</td>
</tr>
<tr>
<td>Martin-Carrasco et al. (2009)</td>
<td>Y</td>
<td>Y</td>
<td>Y7</td>
<td>Y9</td>
<td>UC</td>
<td>Y</td>
<td>Y</td>
<td>Y10 &amp; 11</td>
</tr>
<tr>
<td>Akkerman et al. (2004)</td>
<td>Y+</td>
<td>Y+2</td>
<td>Y+7</td>
<td>UC</td>
<td>UC</td>
<td>UC</td>
<td>Y</td>
<td>Y11</td>
</tr>
<tr>
<td>Coon et al. (2003)</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y9</td>
<td>UC</td>
<td>UC</td>
<td>N</td>
</tr>
<tr>
<td>De Rotrou et al. (2011)</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>UC</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
<td>Y13</td>
</tr>
</tbody>
</table>

**Note.**
- Y= yes, adequately addressed; Y+= yes, addressed well; Y-= yes, but poorly addressed; N= not addressed or not addressed adequately; UC= unclear, not described adequately; NA= not applicable
- 1. Lacking detail in descriptions;
- 2. Multiple methods including recruitment in the community, & health &/or voluntary services; 3. Recruitment from multiple services; 4. Single recruitment method; 5. Recruitment from previous study
- 6. More appropriate or sensitive measures were available but not used; 7. Measures were standardised, valid & reliable
- 8. Small numbers of participants
- 9. Delivery of the intervention, adherence to manual and application of skills (though homework) were monitored; 10. Training to deliver intervention given to facilitators;
- 11. Attendance monitored; 12. Regular supervision of facilitators
- 13. Single blinding of the data analyst; 14. Double blinding of data analyst & participants
- 15. Significant baseline differences between control & intervention conditions treated as a covariate in analysis
## Caregiver Interventions

### Methodology

<table>
<thead>
<tr>
<th>Study</th>
<th>Suitable detail in methods</th>
<th>Suitable recruitment</th>
<th>Suitable Quality of Measures</th>
<th>Suitable Power</th>
<th>Adequate sequence generation</th>
<th>Adequate Allocation conceal</th>
<th>Consistent delivery of int. ensured</th>
<th>Blinding</th>
<th>Suitable method</th>
<th>Control of baseline difference</th>
<th>Intent-to-treat analysis</th>
<th>Control of contextual factors</th>
<th>Outcome reporting biased</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glueckauf et al. (2007)</td>
<td>Y-1</td>
<td>N-5</td>
<td>Y-6</td>
<td>UC-8</td>
<td>UC</td>
<td>UC</td>
<td>N</td>
<td>Y-13</td>
<td>Y</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Steffen et al. 2000</td>
<td>Y-1</td>
<td>Y+2</td>
<td>Y-7</td>
<td>UC-8</td>
<td>UC</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>NA</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Marquez-Gonzalez et al. (2007)</td>
<td>Y-1</td>
<td>Y-3</td>
<td>Y-7</td>
<td>UC</td>
<td>Y</td>
<td>UC</td>
<td>Y+9 &amp; 10</td>
<td>N</td>
<td>Y</td>
<td>NA</td>
<td>Y</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Burgio et al. (2003)</td>
<td>Y-1</td>
<td>Y+2</td>
<td>Y-7</td>
<td>UC</td>
<td>UC</td>
<td>UC</td>
<td>Y+9, 10 &amp; 11</td>
<td>N</td>
<td>Y</td>
<td>NA</td>
<td>N</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>Gallagher-Thompson et al. (2008)</td>
<td>Y</td>
<td>Y-3</td>
<td>Y-7</td>
<td>UC</td>
<td>Y</td>
<td>Y</td>
<td>Y+10, 11 &amp; 12</td>
<td>Y</td>
<td>NA</td>
<td>Y</td>
<td>Y</td>
<td>Y+16</td>
<td>N</td>
</tr>
<tr>
<td>Losada et al. (2011)</td>
<td>Y-1</td>
<td>Y+2</td>
<td>Y-7</td>
<td>UC</td>
<td>Y</td>
<td>UC</td>
<td>Y+10 &amp; 11</td>
<td>Y</td>
<td>Y</td>
<td>NA</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Marriott et al. (2000)</td>
<td>Y</td>
<td>Y-4</td>
<td>Y-6</td>
<td>UC</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>NA</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Gallagher-Thompson et al. (2010)</td>
<td>Y-1</td>
<td>Y-3</td>
<td>Y-7</td>
<td>UC</td>
<td>UC</td>
<td>UC</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
</tbody>
</table>

**Note.** Y = yes, adequately addressed; Y+ = yes, addressed well; Y- = yes, but poorly addressed; N= not addressed or not addressed adequately; UC= unclear, not described adequately; NA= not applicable

1. Lacking detail in descriptions;
2. Multiple methods including recruitment in the community, & health &/or voluntary services;
3. Recruitment from multiple services;
4. Single recruitment method;
5. Recruitment from previous study;
6. More appropriate or sensitive measures were available but not used;
7. Measures were standardised, valid & reliable;
8. Small numbers of participants;
9. Delivery of the intervention, adherence to manual and application of skills (though homework) were monitored;
10. Training to deliver intervention given to facilitators;
11. Attendance monitored;
12. Regular supervision of facilitators;
13. Single blinding of the data analyst;
14. Double blinding of data analyst & participants;
15. Significant baseline differences between control & intervention conditions treated as a covariate in analysis;
16. Evaluations considered the impact of ethnic background;
17. Lack of detail in reporting of negative outcomes.
3. 3 Descriptive Characteristics of the Intervention Studies

Half of the studies focused on caregivers of an individual with Alzheimer’s disease. The remaining studies had a broad focus, including caregivers of individuals with a range of different types of dementia. Where reported, this was suggested to have included vascular and fronto-temporal dementias, and Lewy body diseases. Female caregivers were the focus of three studies. No studies limited participation to male caregivers only.

The numbers of caregivers participating in the studies ranged from 13 to 518, with mean participants of 60 in intervention and 52 in control conditions. On average, 82 per cent of study participants were female, with roughly half of participants caring for a spouse or parent, 42 per cent and 48 per cent respectively. Care was provided for between 30 to 69 months prior to study participation.

Intervention duration ranged from 8 to 17 sessions (mean = 11.3) or 1.5 to 26 hours (mean = 16.4). Half of interventions were delivered in groups, with individual and technology based delivery each used in one study, see table 1. The remaining studies employed mixed delivery incorporating all three methods. Minimal support controls were used by 43 per cent of studies, 36 per cent of studies utilised waiting list control conditions and the remaining used standard care.

Of the studies included, 11 evaluated outcomes immediately after the end of the intervention.
Table 2
Summary of Included Study Characteristics

<table>
<thead>
<tr>
<th>Study</th>
<th>Participant description</th>
<th>CBT Intervention</th>
<th>Control</th>
<th>Primary cg outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Burgio et al. (2003)</td>
<td>All AD, mainly female cgs</td>
<td>CR behaviour management</td>
<td>61</td>
<td>Mixed methods</td>
</tr>
<tr>
<td>Coon et al. (2003)</td>
<td>All female, mostly AD, spouse cgs</td>
<td>Stress management (anger &amp; depression)</td>
<td>86</td>
<td>Group</td>
</tr>
<tr>
<td>Belle et al. (2006)</td>
<td>All AD, mostly female, AC cgs</td>
<td>Stress management &amp; CR behaviour management</td>
<td>261</td>
<td>Mixed methods</td>
</tr>
</tbody>
</table>

Note. s= sessions; cg= caregivers; CR= care recipient; AD = Alzheimer’s disease; AC cgs= adult child caregivers; AC= adaptive coping; DT = dysfunctional thoughts; SC= standard care; MS= minimal support; WL= waiting list; MH= mental health; QoL= quality of life.
<table>
<thead>
<tr>
<th>Study</th>
<th>Participant description</th>
<th>CBT Intervention</th>
<th>Control</th>
<th>Primary cg outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gallagher-Thompson et al. (2008)</td>
<td>All female &amp; AD cgs</td>
<td>Stress management &amp; CR behaviour management</td>
<td>Group</td>
<td>MS</td>
</tr>
<tr>
<td>Martín-Carrasco et al. (2009)</td>
<td>All AD, mostly female, spouse cgs</td>
<td>Stress management &amp; CR behaviour management</td>
<td>Ind.</td>
<td>SC</td>
</tr>
<tr>
<td>Au et al. (2010)</td>
<td>All female, AD cgs, mostly ac</td>
<td>Stress management</td>
<td>Group</td>
<td>WL</td>
</tr>
<tr>
<td>Gallagher-Thompson et al. (2010)</td>
<td>Mostly female cgs</td>
<td>CR behaviour management</td>
<td>Tech.</td>
<td>MS</td>
</tr>
</tbody>
</table>

Note.  
$s =$ sessions; cgs= caregivers; CR= care recipient; AD = Alzheimer’s disease; AC cgs= adult child caregivers; AC= adaptive coping; DT = dysfunctional thoughts; SC= standard care; MS= minimal support; WL= waiting list; MH= mental health; QoL= quality of life
<table>
<thead>
<tr>
<th>Study</th>
<th>Participant description</th>
<th>CBT Intervention</th>
<th>Control</th>
<th>Primary cg outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>De Rotrou et al. (2011)</td>
<td>All AD, mostly female, spouse cgs</td>
<td>Stress management &amp; CR behaviour management</td>
<td>Group</td>
<td>SC 64</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Depression Burden Competence Coping</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Depression DT Leisure time</td>
</tr>
</tbody>
</table>

Note.  
s= sessions; cgs= caregivers; CR= care recipient; AD = Alzheimer’s disease; AC cgs= adult child caregivers; AC= adaptive coping; DT = dysfunctional thoughts; SC= standard care; MS= minimal support; WL= waiting list; MH= mental health; QoL= quality of life
3.4 The effect of CBT for caregivers

Standard mean effect sizes were calculated for each outcome variable based on the weighted study effect sizes.

3.4.1 Depression.

The effect sizes of 11 studies were analysed to determine the impact of cognitive behavioural therapy on caregivers depression, see figure 2. Within these studies, 708 caregivers received the active intervention.

![Forest Plot of the study effect sizes for the impact of CBT on caregiver depression](image)

Note. CI= confidence interval.

Figure 2. Forest Plot of the study effect sizes for the impact of CBT on caregiver depression

CBT had a significant moderate effect, $g^*= -0.55$, 95% CI (-0.92, -0.19), $p=0.003$, on caregiver depression (see figure 2). The common language effect size (CLES = 0.65) for the two group pre-post intervention effect size indicates that 65 percent of the time a randomly selected CBT participant would be less depressed than a caregiver who received minimally supportive interventions or no intervention. The tests of heterogeneity was significant, $Q=93.40$, $p<0.001$, with the $I^2$ value, 89.29, suggesting a high degree of heterogeneity.
The funnel plot, figure 3, is asymmetrical and skewed on the right side. This would suggest the existence of a publication bias in this review, with few studies with small, negative effects or larger studies with negative effects located during the search process. The Trim and Fill analysis imputed four study effects in the funnel plot to create a symmetrically plot. The resulting adjusted mean effect size was estimated to be -0.80, with a 95 per cent confidence interval of -0.89 to -0.73. The finding suggests that the population effect size was under-estimated as a result of this bias.

3.4.2 Burden.

In total, 11 study effect sizes were included in the analysis of caregiver burden, see figure 4. This represented the outcomes of 681 caregivers who received cognitive behavioural therapy.
The impact of CBT on burden was statistically significant, with an effect size of -0.37, 95% CI (-0.57, -0.17), p < 0.001. This equates to a CLES of 0.60, indicating a 60 per cent probability that a CBT participant would report less burden post intervention than a caregiver receiving minimally supportive interventions. Tests of heterogeneity were statistically significant, $Q = 20.87$, $p = 0.02$. The $I^2$ values, 52%, indicated moderate heterogeneity.
The funnel plot, figure 5, is asymmetrical on the right side, indicating the existence of a bias in the outcomes of studies evaluated within this review. Few large scale studies or studies with small, positive effects were located during the search process. The Trim and Fill analysis imputed five study effects in the funnel plot. The imputed effect size was estimated to be -0.20 with a 95% confidence interval of -0.42 and 0.022.

3.4.3 Mental Health.

The effect sizes of 13 studies were analysed to determine the impact of cognitive behavioural therapy on the overall mental health of caregivers, see figure 6. Within these studies, 840 caregivers received the active intervention.

![Forest Plot of the effect of CBT on caregiver mental health](image)

**Note.**  
CI = confidence interval; Hedges’ g = effect size  
Figure 6. Forest Plot of the effect of CBT on caregiver mental health

CBT was found to have a significant effect, \( g^* = -0.54, 95\% \text{ CI } (-0.78, -0.30), \) \( p < 0.001, \) on caregiver mental health difficulties (see figure 7). This equates to a CLES of 0.65, indicating a 65 per cent probability that a CBT participant would report less symptoms of mental health difficulties post intervention than a caregiver receiving a
minimally supportive intervention. The tests of heterogeneity was significant, $Q=64.26$, $p<0.001$, with an $I^2$ value of 81.33 indicating a high degree of heterogeneity.

![Funnel Plot of Precision by Hedges's g](image)

- = imputed study effect sizes  ○ = observed study effect sizes

**Figure 7.** Funnel plot of the precision study effect sizes

The funnel plot, seven, is asymmetrical and skewed on the right side, indicating the existence of a bias in the outcomes of studies evaluated within this review. Few studies with small, negative effects were located during the search process. The Trim and Fill analysis imputed two study effects in the funnel plot. The imputed effect size was estimated to be -0.68 with a 95% confidence interval of -0.97 and -0.40.

### 3.4.4 Adaptive coping.

The standard mean effect size was determined for caregiver adaptive coping from the outcomes of 8 studies, see figure 8. Within these studies, 634 caregivers received the active intervention.
The impact of CBT on caregiver adaptive coping was significant, with an effect size of 0.48, 95% CI (0.02, 0.24), p< 0.001, see figure 8. The CLES of 0.63 equates to a 63 per cent probability that a randomly selected caregiver who engaged in CBT would engage in more methods of adaptive coping at post intervention than a caregiver who received minimally supportive intervention. A significant q-value, 22.41, p < 0.01, and $I^2$ value of 68.76 indicate a moderate degree of heterogeneity.

The funnel plot is asymmetrical and skewed on the right side, see figure 9.

This would suggest the existence of a publication bias in this review, with few studies with small, negative effects or larger studies with negative effects located during the
search process. The Trim and Fill analysis imputed two study effects in the funnel plot. The adjusted effect size, $g = 0.44$, 95% CI (0.20 to 0.68), was smaller than the original estimate of the population effect size. This suggests the effect size was over-estimated as a result of the publication bias.

3.4.5 Dysfunctional Thoughts about caregiving. In total, 5 studies reported outcomes relating to appraisals of caregivers about their role, see figure 10. This represented the outcomes of 212 caregivers participating in a cognitive behaviour intervention.

![Figure 10. Forest Plot of the effect of CBT on caregiver dysfunctional thoughts](image)

Overall CBT as an intervention was found to have a significant effect, $g^* = -1.33$, 95% CI (-2.22, -0.44), $p < 0.001$, on the dysfunctional thoughts held by caregivers about caregiving, see figure 9. This equates to a CLES of 0.83, indicating an 83 per cent probability that a CBT participant would experience fewer dysfunctional thoughts at post intervention than a caregiver receiving a minimally supportive intervention or no intervention. The tests of heterogeneity were significant, $Q=37.38$, $p<0.001$, with the $I^2$ value of 89.30 suggesting a high degree of heterogeneity. The findings were unlikely to be accounted for by chance.
The funnel plot is asymmetrical and skewed on the right side, see figure 11, indicating the existence of a bias in the outcomes of studies evaluated within this review. A small number of studies were identified during the literature search which evaluated the impact of interventions on dysfunctional thoughts. The Trim and Fill analysis imputed one study effect in the funnel plot. The adjusted effect size was estimated to be -1.64, 95% CI (-2.71, -0.58). As the adjusted mean effect size is larger than the raw mean effect size, the effect of CBT on dysfunctional thoughts appears to have been under-estimated as a result of the publication bias.

3.5 Subgroup analyses of the effect of CBT according to intervention characteristics

A Q-test was undertaken based on variance analysis to compare the mean effect size, hedge’s g*, for different subgroups of studies classified according to the characteristics of the cognitive behavioural intervention.

The difference in caregiver depression between intervention studies using minimal support, standard support and waiting list control conditions is statistically significant ($Q_{bet^*} = 7.33$, $df = 2$, $p = 0.03$). This indicates that the effect size for the
impact of CBT on depression is related to the type of control condition, see table 3. A statistically significant effect size for the impact of CBT on depression was found for studies comparing this intervention with a waiting list condition, $g^* = -1.24$, 95% CI [-1.84, -0.63], $p < 0.001$. Non-significant effect sizes for the impact of CBT on depression of -0.23 and -0.23 were found in studies comparing CBT to minimal support or standard care, respectively. This suggests that the effects of CBT on depression are only statistically significant when compared to no intervention.

Non-significant differences were found in the mean effect sizes on caregiver burden, adaptive coping and dysfunctional thoughts between studies according to the type of control condition ($Q_{bet}^* = 2.98$, $df = 3$, $p = 0.90$, $Q_{bet}^* = 2.42$, $df = 2$, $p = 0.30$, and $Q_{bet}^* = 0.25$, $df = 2$, $p = 0.88$, respectively). The effect sizes for the impact of CBT on burden, adaptive coping and dysfunctional thoughts did not significantly differ according to the type of control condition.

A statistically significant difference was found in caregiver mental health between intervention studies using minimal support, standard support and waiting list conditions ($Q_{bet}^* = 10.81$, $df = 2$, $p = 0.004$).

The effect size for the impact of CBT on mental health difficulties was statistically significant for studies comparing this intervention with a waiting list condition, $g^* = -1.06$, 95% CI [-1.44, -0.67], $p < 0.001$.

A statistically significant effect sizes for the impact of CBT on mental health difficulties was found for studies comparing CBT to minimal support interventions, $g^* = -0.29$, 95% CI [-0.58, 0.01], $p = 0.05$. The impact of CBT on mental health difficulties was not statistically significant when studies compared the CBT to standard care, with an effect size of -0.32.
Table 3

Subgroup analysis of the effect of CBT on outcomes according to the control type

<table>
<thead>
<tr>
<th></th>
<th>Minimal Support</th>
<th></th>
<th>Standard Care</th>
<th></th>
<th>Waiting list</th>
<th></th>
<th>Q*bet</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>g*</td>
<td>95% CI</td>
<td>g*</td>
<td>95% CI</td>
<td>g*</td>
<td>95% CI</td>
<td></td>
</tr>
<tr>
<td>Depression</td>
<td>-0.23</td>
<td>-0.72, 0.25</td>
<td>-0.23</td>
<td>-0.98, 0.52</td>
<td>-1.24***</td>
<td>-1.84, -0.63</td>
<td>7.33*</td>
</tr>
<tr>
<td>Burden</td>
<td>-0.43**</td>
<td>-0.62, -0.07</td>
<td>-0.15*</td>
<td>-0.56, 0.27</td>
<td>-0.66**</td>
<td>-1.08, -0.24</td>
<td>2.98</td>
</tr>
<tr>
<td>MH</td>
<td>-0.29*</td>
<td>-0.58, 0.01</td>
<td>-0.32</td>
<td>-0.72, 0.09</td>
<td>-1.06***</td>
<td>-1.44, -0.67</td>
<td>10.81**</td>
</tr>
<tr>
<td>AC</td>
<td>0.27</td>
<td>-0.05, 0.60</td>
<td>0.63***</td>
<td>0.29, 0.96</td>
<td>0.60*</td>
<td>0.01, 1.19</td>
<td>2.42</td>
</tr>
<tr>
<td>DT</td>
<td>-1.26*</td>
<td>-4.52, 1.99</td>
<td>-0.75</td>
<td>-3.77, 2.26</td>
<td>-1.63</td>
<td>-3.41, 0.15</td>
<td>0.25</td>
</tr>
</tbody>
</table>

Note. M.H = Mental health; A.C = Adaptive coping; D.T = dysfunctional thoughts; g* = adjusted, weighted effect size, hedge’s g; 95% CI= 95% confidence interval; Q*bet = weighted sum of squared deviations of the subgroup means about the grand mean.

The difference in caregiver adaptive coping between intervention studies using individual, group and mixed or combined methods of delivery is statistically significant (Q*bet = 11.40, df = 2, p = 0.003). Studies reporting measures of adaptive coping did not use technology-based CBT. The finding indicates that the effect size for the impact of CBT on adaptive coping is related to the type of intervention delivery method, see table 4. The impact of CBT on adaptive coping was statistically significant for studies using individual delivery methods, with an effect size of 1.11, 95% CI [0.61, 1.61], p < 0.001. A statistically significant effect size for the impact of CBT on adaptive coping was found for studies using a group delivered interventions, g* = 0.47, 95% CI [0.23, 0.72], p < 0.001.
The impact of CBT on adaptive coping was also significantly significant for studies delivered using a mixture of methods, $g^* = 0.22$, 95% CI [0.03, 0.41], $p < 0.001$.

These findings indicate that individual CBT had the largest effect size on adaptive coping when compared to group or mixed methods of delivery.

Non-significant differences were found in the mean effect sizes on caregiver depression, burden, mental health difficulties and dysfunctional thoughts between studies according to the type of delivery method ($Q_{bet}^* = 1.07, df = 2, p = 0.58$; $Q_{bet}^* = 0.59, df = 2, p = 0.23$; $Q_{bet}^* = 2.40, df = 4, p = 0.663$; $Q_{bet}^* = 0.004, df = 1, p = 0.95$, respectively).
Table 4

Subgroup analysis of the impact of delivery method on caregiver outcomes

<table>
<thead>
<tr>
<th></th>
<th>Individual</th>
<th>Group</th>
<th>Technology</th>
<th>Mixed</th>
<th>$Q^*_{bet}$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$g^*$</td>
<td>95% CI</td>
<td>$g^*$</td>
<td>95% CI</td>
<td>$g^*$</td>
</tr>
<tr>
<td>Depression</td>
<td>NA</td>
<td></td>
<td>-0.76**</td>
<td>-1.32,</td>
<td>-0.15</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>-0.19</td>
<td></td>
<td>1.23</td>
</tr>
<tr>
<td>Burden</td>
<td>-0.32</td>
<td>-1.04,</td>
<td>-0.37*</td>
<td>-0.73,</td>
<td>-0.67</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.41</td>
<td>0.01</td>
<td></td>
<td>0.08</td>
</tr>
<tr>
<td>MH</td>
<td>-0.52</td>
<td>-1.46,</td>
<td>-0.67***</td>
<td>-1.04,</td>
<td>-1.05*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.43</td>
<td>-0.30</td>
<td></td>
<td>-0.05</td>
</tr>
<tr>
<td>AC</td>
<td>1.11***</td>
<td>0.61,</td>
<td>0.47***</td>
<td>0.23,</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.61</td>
<td>0.72</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DT</td>
<td>-1.35**</td>
<td>-2.37,</td>
<td>NA</td>
<td>-1.27**</td>
<td>-2.27,</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>-0.33</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note.  
MH= Mental health; AC= Adaptive coping; DT= dysfunctional thoughts; $g^*$= adjusted, weighted effect size, hedge’s $g$; 95% CI= 95% confidence interval; $Q^*_{bet}$ = weighted sum of squared deviations of the subgroup means about the grand mean.  
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.  

3.6 Subgroups analyses of the effect of CBT according to care and caregiver characteristics

A Q-test was undertaken based on variance analysis to compare the mean effect size, hedge’s g*, for different subgroups of studies classified according to the demographics of the caregivers and characteristics of care context.

The difference in caregiver depression between intervention studies with a mean care duration of 30 to 36, 37 to 43, 44 to 49, and 50 to 56 months is statistically significant ($Q_{bet}^* = 18.00$, $df = 4$, $p = 0.001$). This indicates that the effect size for the impact of CBT on depression is related to the mean study duration of caregiving, see table 5. A statistically significant effect size for the impact of CBT on depression was found for studies reporting the mean duration of caregiving as between 37 and 43 months, $g^* = -1.99$, 95% CI [-2.74, -1.25], $p < 0.001$. The impact of CBT on depression was not statistically significant for studies reporting the mean duration of caregiving between 30 to 36, 44 to 49 and 50 to 56 months, with effect sizes of -0.40 for all of these categories. The findings suggest that CBT was only an effective intervention for caregiver depression for individuals caring for 37 to 43 months.

No statistically significant difference in the mean effect sizes on caregiver burden was found according to the mean care duration ($Q_{bet}^* = 8.59$, $df = 5$, $p = 0.13$). Although the difference between groups was not significant, a significant effect size was established for the impact of CBT on burden for studies with a mean care duration of 37-43 months, $g^* = -3.05$, 95% CI [-5.52, -0.57], $p = 0.05$.

A statistically significant difference was found in caregiver mental health between intervention studies with a mean care duration of 30 to 36, 37 to 43, 44 to 49, and 50 to 56 months ($Q_{bet}^* = 13.55$, $df = 4$, $p = 0.009$). The impact of CBT on mental health difficulties was significantly significant for studies reporting a mean care
duration of 37 to 43 months, \( g^* = -1.40, 95\% \ CI [-1.93, -0.86], p < 0.001 \). A statistically significant effect size for the impact of CBT on mental health difficulties was found for studies reporting a mean care duration of 44 to 49 months of -0.56, 95% CI [-1.09, -0.03], \( p = 0.03 \). The impact of CBT on mental health difficulties was not statistically significant for studies reporting the mean duration of caregiving between 30 to 36 and 50 to 56 months, with effect sizes of -0.47 and -0.40, respectively. These findings indicate that the largest effect of CBT on mental health difficulties was found for studies with a mean care duration of 37 to 43 months.

The difference in caregiver adaptive coping between intervention studies reporting the mean care duration of 30 to 36, 44 to 49, 50 to 56, and 64 to 69 months was statistically significant \((Q_{bet}^* = 16.37, df = 4, p = 0.003)\). A statistically significant effect size for the impact of CBT on adaptive coping was found for studies with a mean care duration of 30 to 36 months of 0.81, 95% CI [0.49, 1.14], \( p < 0.001 \), see table 6. The impact of CBT on adaptive coping was not significant for a mean care duration of 37 to 43 month, with an effect size of 1.27. The effect size for the impact of CBT was statistically significant for studies reporting the mean duration of care as 50 to 56 months, \( g^* = 0.57, 95\% \ CI [0.18, 0.96], p= 0.004 \). The impact of CBT on adaptive coping was statistically significant for studies with a mean care duration of 64 to 69, with an effect size of 1.64, 95% CI [0.29, 2.98], \( p = 0.02 \). CBT is, therefore, indicated as being most effective for caregivers who have provided care for an individual with dementia for 64 to 69 months.

A statistically significant difference was found in caregiver dysfunctional thoughts between intervention studies with a mean care duration of 30 to 36, 37 to 43, and 50 to 56 months \((Q_{bet}^* = 29.40, df = 3, p = p < 0.001)\).
The impact of CBT on dysfunctional thoughts was statistically significant for studies reporting a mean care duration of 37 to 43, with an effect size of -3.75, 95% CI [-4.83, -2.67], \( p < 0.001 \), see table 6. A statistically significant effect size for the impact of CBT was found for studies with a mean care duration of 50 to 56 months of -0.57, 95% CI [-0.97, -0.17], \( p < 0.001 \). Non-significant effect sizes for the impact of CBT on dysfunctional thoughts of -0.95 and -1.27 for studies reporting the mean care duration between 30 to 36, and 64 to 69 months, respectively. This suggests that CBT has a larger effect on dysfunctional thoughts when delivered to caregivers who have been providing care for 37 to 43 months.
Table 5

Subgroup analysis of the effect of CBT on outcomes according to the duration of care provision

<table>
<thead>
<tr>
<th></th>
<th>30-36 months</th>
<th>37-43 months</th>
<th>44-49 months</th>
<th>50-56 months</th>
<th>57-63 months</th>
<th>64-69 months</th>
<th>Q*</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>g*</td>
<td>95% CI</td>
<td>g*</td>
<td>95% CI</td>
<td>g*</td>
<td>95% CI</td>
<td>g*</td>
<td>95% CI</td>
</tr>
<tr>
<td>Depression</td>
<td>-0.40</td>
<td>-1.50, 0.69</td>
<td>-1.99***</td>
<td>-2.74, -1.25</td>
<td>-0.40</td>
<td>-1.10, 0.30</td>
<td>-0.40</td>
<td>-1.04, 0.23</td>
</tr>
<tr>
<td>Burden</td>
<td>-0.51*</td>
<td>-0.99, -0.05</td>
<td>-3.05*</td>
<td>-5.52, -0.57</td>
<td>-0.33</td>
<td>-0.75, 0.09</td>
<td>-0.40</td>
<td>-0.98, 0.19</td>
</tr>
<tr>
<td>MH</td>
<td>-0.47</td>
<td>-1.08, 0.14</td>
<td>-1.40***</td>
<td>-1.93, -0.86</td>
<td>-0.56*</td>
<td>-1.09, -0.03</td>
<td>-0.40</td>
<td>-0.95, 0.14</td>
</tr>
<tr>
<td>AC</td>
<td>0.81***</td>
<td>0.49, 1.14</td>
<td>1.27</td>
<td>-1.12, 3.66</td>
<td>NA</td>
<td>0.57**</td>
<td>0.18</td>
<td>0.96</td>
</tr>
<tr>
<td>DT</td>
<td>-0.95</td>
<td>-1.81, -0.08</td>
<td>-3.75***</td>
<td>-4.83, -2.67</td>
<td>NA</td>
<td>-0.57**</td>
<td>-0.97, 0.17</td>
<td></td>
</tr>
</tbody>
</table>

MH= Mental health; AC= Adaptive coping; DT= dysfunctional thoughts; g*= adjusted, weighted effect size, hedge’s g; 95% CI= 95% confidence interval; Q*bet= weighted sum of squared deviations of the subgroup means about the grand mean; NA= not applicable, no average length of care time reported for this category; *p < 0.05, **p < 0.01, ***p < 0.001.
The difference in caregiver depression between intervention studies for Alzheimer caregivers and caregivers of mixed dementia diagnoses is statistically significant ($Q_{bet}^* = 4.75$, $df = 2$, $p < 0.001$), see table 6. A statistically significant effect size for the impact of CBT on depression was found for studies including caregivers of all types of dementia, $g^* = -1.44$, 95% CI $[-2.15, -0.73]$, $p = 0.001$. A non-significant effect size for the impact of CBT was determined for Alzheimer caregivers of -0.25. This suggests that CBT is more effective when participants care for individuals with different types of dementia.

A statistically significant difference was found in caregiver burden between intervention studies for Alzheimer caregivers and caregivers for an individual with a range of dementia types ($Q_{bet}^* = 5.66$, $df = 2$, $p = 0.05$). The effect size for the impact of CBT on burden was statistically significant for studies recruiting caregivers of mixed dementia types, $g^* = -0.91$, 95% CI $[-1.51, -0.30]$, $p = 0.003$. The impact of CBT was not significant for Alzheimer caregivers, with an effect size of -0.22. CBT appears, therefore, to have a larger effect when caregivers of all dementia types participate.

The difference in caregiver mental health difficulties between intervention studies for Alzheimer caregivers and caregivers of mixed dementia diagnoses is statistically significant ($Q_{bet}^* = 6.32$, $df = 2$, $p = 0.04$). Statistically significant effect sizes for the impact of CBT on mental health difficulties was found for studies including caregivers of Alzheimer’s disease and all types of dementia, $g^* = -0.39$, 95% CI $[-0.66, -0.12]$, $p = 0.004$, and $g^* = -1.17$, 95% CI $[-1.71, -0.62]$, $p < 0.001$, respectively. Subsequently, the largest effect was found for interventions including participants who care for individuals with a range of different types of dementia.
No statistically significant differences in the mean effect sizes on caregiver adaptive coping and dysfunctional thoughts was found between studies for Alzheimer caregivers and caregivers of all dementia types ($Q_{bet}^* = 1.27, df = 1, p = 0.26$, and $Q_{bet}^* = 0.75, df = 2, p = 0.69$, respectively).

Table 6
Subgroup analysis of the effect of CBT on outcomes according to dementia type specificity

<table>
<thead>
<tr>
<th></th>
<th>AD Specific</th>
<th>Mixed</th>
<th>$Q_b$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>g*</td>
<td>95% CI</td>
<td>g*</td>
</tr>
<tr>
<td>Depression</td>
<td>-0.25 -0.76, 0.27</td>
<td><strong>1.44</strong>* -2.15, -0.73</td>
<td><strong>4.75</strong>*</td>
</tr>
<tr>
<td>Burden</td>
<td>-0.22 -0.41, -0.03</td>
<td><strong>-0.91</strong> -1.51, -0.30</td>
<td><strong>5.66</strong></td>
</tr>
<tr>
<td>MH</td>
<td>-0.39 -0.66, -0.12</td>
<td><strong>-1.17</strong>* -1.71, -0.62</td>
<td><strong>6.32</strong></td>
</tr>
<tr>
<td>AC</td>
<td>0.41** 0.15, 0.68</td>
<td><strong>0.77</strong> 0.214, 1.31</td>
<td>1.27</td>
</tr>
<tr>
<td>DT</td>
<td>-0.95 -4.23, 2.34</td>
<td>-1.90* -3.82, 0.02</td>
<td>0.75</td>
</tr>
</tbody>
</table>

Note. M.H= Mental health; A.C= Adaptive coping; D.T= dysfunctional thoughts; g*= adjusted, weighted effect size, hedge’s g; 95% CI= 95% confidence interval; $Q_{bet}^*$= weighted sum of squared deviations of the subgroup means about the grand mean.

$$p < 0.05, \cdot\cdot p < 0.01, \cdot\cdot\cdot p < 0.001.$$

3.7 Meta-regression: Predictive value of intervention characteristics on CBT outcome

Simple regression based on the random effects model was used to examine the relationship between covariates and study effect sizes. Intervention covariates included length of interventions according to the number of sessions and total time. Caregiver covariates included caregiver gender, relationship to the care recipient, and ethnicity.
Given the small number of studies, single covariate analyses were undertaken. It is unlikely that this review will have sufficient power to conduct analyses with multiple covariates.

**3.7.1 Length in sessions.**

The length of intervention according to the total number of sessions did not explain a significant proportion of variance in the effect sizes for the impact of CBT on depression, $\beta = 0.11, SE = 0.10, Z = -1.15, p = 0.25$. The total number of sessions explained a significantly proportion of the variance in the effect sizes for the impact of CBT on adaptive coping, $\beta = -0.07, SE = 0.04, Z = -1.97, p = 0.05$, see table 3. This indicated that CBT is more effective when interventions have fewer sessions, see figure 12.

![Regression of N sessions on Hedges's g](image)

Note. N sessions = length of the intervention according to the number of sessions

Figure 12. Regressional analysis of intervention session length & adaptive coping

However, the total number of sessions was not significantly predictive of the effect sizes for the impact of CBT on burden or mental health difficulties, $\beta = 0.01, SE = 0.02, Z = 0.42, p = 0.68$, and $\beta = 0.09, SE = 0.06, Z = 1.53, p = 0.13$, respectively.
The variance in effect sizes for the impact of CBT on dysfunctional thoughts was not significantly explained by the intervention length according to the total number of sessions, $\beta = 0.03, SE = 0.29, Z = 0.10, p = 0.92$. 
### Table 7
Summary of simple meta-regression analyses for intervention characteristics

<table>
<thead>
<tr>
<th></th>
<th>Depression</th>
<th>Burden</th>
<th>M.H</th>
<th>A.C</th>
<th>D.T</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>SE</td>
<td>B</td>
<td>SE</td>
<td>B</td>
</tr>
<tr>
<td>N sessions</td>
<td>0.12</td>
<td>0.10</td>
<td>-0.01</td>
<td>0.03</td>
<td>0.09</td>
</tr>
<tr>
<td>Length (hrs)</td>
<td>-0.006</td>
<td>0.03</td>
<td>0.01</td>
<td>0.01</td>
<td>0.006</td>
</tr>
</tbody>
</table>

*Note.* M.H = Mental health; A.C = Adaptive coping; D.T = dysfunctional thoughts; Hrs = hours; B = regression coefficient; SE = standard error. *p < 0.05, **p < 0.01, ***p < 0.001.
3.7.2 Length in hours

A non-significant predictive relationship was found between the duration of the intervention in hours and effect sizes for the impact of CBT on depression, burden, and mental health, $\beta = -0.006, SE = 0.03, Z = -0.16, p = 0.87$ and $\beta = 0.01, SE = 0.01, Z = 1.30, p = 0.19$, respectively.

The variance in effect sizes for the impact of CBT on mental health difficulties was not significantly explained by the intervention length in total number of hours, $\beta = 0.006, SE = 0.03, Z = 0.22, p = 0.83$, see table 3. The total length of the intervention in hours was also not found to significantly predict the effect size of CBT on adaptive coping or dysfunctional thoughts ($\beta = -0.02, SE = 0.18, Z = -0.12, p = 0.90$, respectively).

3.8 Meta-regression: Predictive value of caregiver and care characteristics on CBT outcome

Simple meta-regression was used to evaluate the predictive impact of caregiver characteristics on effects sizes for the impact of CBT. Covariates included the percentage of spouse caregiver participants, adult child caregivers, female caregivers and caregivers with a Caucasian ethnic background.

3.8.1 Caregiver relationship.

3.8.1.1 Spouse.

The mean number of spouse caregiver participants reported by the studies did not significantly predict study effect sizes for the impact of CBT on adaptive coping, $\beta = -0.004, SE = 0.01, Z = -0.29, p = 0.77$, see table 8. A significant predictive relationship was not found between the percentage of spousal caregivers and the effect sizes for the impact of CBT on burden, $\beta = 0.01, SE = 0.008, Z = 1.26, p = 0.21$. The variance in effect sizes for the impact of CBT on dysfunctional thoughts was not
significantly explained by percentage of spousal caregivers, $\beta = -0.07, SE = 0.04, Z = -1.60, p = 0.11$. The percentage of spouse caregiver participants reported by the studies did not significantly predict the effect sizes for the impact of CBT on mental health difficulties or depression, $\beta = -0.02, SE = 0.01, Z = -1.47, p = 0.14$ and $\beta = -0.03, SE = 0.02, Z = -1.55, p = 0.11$.

### 3.8.1.2 Adult child

The percentage of adult child caregiver participants reported by the studies significantly predicted study effect sizes for the impact of CBT on burden, $\beta = -0.01, SE = 0.009, Z = -1.98, p = 0.05$. This indicated that CBT is more effective when fewer adult child caregivers engaged in the intervention, see figure 13.

![Figure 13. Correlation between caregiver burden & the proportion of adult child caregivers participating in intervention studies](image)

**Note.**

Relationship (%ac) = nature of the relationship between caregiver and care recipient according to the percentage of adult child caregiver participants reported by the studies.

A non-significant predictive relationship was found between the percentage of female caregivers reported by the studies and effect sizes for the impact of CBT on depression and mental health, $\beta = 0.009, SE = 0.03, Z = 0.28, p = 0.78$, and $\beta = 0.006,$
$SE = 0.03, Z = 0.24, p = 0.81$, respectively. The variance in effect sizes for the impact of CBT on dysfunctional thoughts was not significantly explained by percentage of adult child caregivers, $\beta = 0.06, SE = 0.05, Z = 1.18, p = 0.24$.

The percentage of adult child caregiver participants reported by the studies did not significantly predict the effect size for the impact of CBT on adaptive coping, $\beta = 0.001, SE = 0.01, Z = -0.10, p = 0.92$.

### 3.8.2 Caregiver gender.

A non-significant predictive relationship was found between the percentage of female caregivers reported by the studies and effect sizes for the impact of CBT on depression, and burden, $\beta = -0.03, SE = 0.02, Z = -1.52, p = 0.13, \beta = -0.007, SE = 0.008, Z = -0.97, p = 0.33$, respectively. The variance in effect sizes for the impact of CBT on mental health difficulties was not significantly explained by percentage of female caregivers, $\beta = -0.02, SE = 0.02, Z = -1.30, p = 0.19$.

The percentage of female caregivers was also not found to significantly predict the effect size of CBT on adaptive coping or dysfunctional thoughts ($\beta = -0.005, SE = 0.01, Z = -0.45, p = 0.65$ and $\beta = -0.06, SE = 0.04, Z = -1.48, p = 0.14$, respectively).

### 3.8.3 Ethnic Background.

The percentage of caregivers reported by studies as Caucasian was not found to significantly predict the effect of CBT on burden, mental health difficulties or adaptive coping, $\beta = 0.005, SE = 0.004, Z = 1.16, p = 0.25, \beta = -0.007, SE = 0.005, Z = -1.37, p = 0.17$ and $\beta = -0.04, SE = 0.004, Z = -0.95, p = 0.34$, respectively, see table 8. As small numbers of studies reported the ethnic background of caregivers, differences could not subsequently be evaluated for depression and dysfunctional thoughts, see table 8.
Table 8

Meta-regressional analyses of the impact of caregiver characteristics on outcomes

<table>
<thead>
<tr>
<th></th>
<th>Depression</th>
<th>Burden</th>
<th>M.H</th>
<th>A.C</th>
<th>D.T</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>SE</td>
<td>B</td>
<td>SE</td>
<td>B</td>
</tr>
<tr>
<td>% female</td>
<td>-0.03</td>
<td>0.02</td>
<td>-0.008</td>
<td>0.01</td>
<td>-0.02</td>
</tr>
<tr>
<td>% spouse</td>
<td>-0.004</td>
<td>0.02</td>
<td>0.001</td>
<td>0.008</td>
<td>-0.02</td>
</tr>
<tr>
<td>% adult child</td>
<td>0.09</td>
<td>0.03</td>
<td>-0.02*</td>
<td>0.01</td>
<td>0.006</td>
</tr>
<tr>
<td>% Caucasian</td>
<td></td>
<td></td>
<td>0.01</td>
<td>0.005</td>
<td>-0.006</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>NU</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note.  
M.H= Mental health; A.C= Adaptive coping; D.T= dysfunctional thoughts; SE= standard error; NU= not undertaken, insufficient numbers of studies;  
*p < 0.05, **p < 0.01, ***p < 0.001.
4.0 Discussion

4.1 CBT as a means of alleviating distress and maladaptive coping

Cognitive behaviour therapy (CBT) applied with informal dementia caregivers is efficacious in improving depression, burden and mental health (see p. 24, 26 & 27).

These findings were reflected those established by the meta-analysis by Pinquart and Sorensen (2006). Small to moderate effect sizes of -0.36 and -0.70 were reported by Pinquart and Sorensen, (2006) for burden and depression, respectively. This compares to effects of -0.37 and 0.55 for burden and depression, established in this review (see p. 24 & 26).

Whilst the outcomes for burden are modest, this outcome has been suggested as relatively insensitive to change (Cooke et al., 2001; Knight et al., 1993). A number of caregiver interventions, such as skills training interventions, psychoeducation, supportive counselling, and behavioural management, have not been found to have a significant effect on burden when significant effects have been determined for other outcome variables (Chien et al., 2011; Goy et al., 2010; Pinquart & Sorensen, 2006; Selwood et al., 2007). Insensitivity to change has been attributed to the term burden encapsulating two related but distinct concepts, objective and subjective burden (Braithwaite, 1992). Objective burden relates to the extent to which the caregiver role places restrictions on the caregiver’s life (Montgomery et al., 1985). However, the emotional reactions evoked by the role are defined as subjective burden (Montgomery et al., 1985).

The significant effects of CBT on burden may indicate that this intervention influences change in subjective and objective burden. Specifically, emotional regulation techniques in CBT may influence change in subjective burden, with modification of dysfunctional thoughts indirectly effecting objective burden. It would
be beneficial to differentially evaluate these concepts. However, as outcome measures have tended to evaluate this concept globally, this meta-analysis computed effect sizes for burden as a global concept rather than considering the subject and objective burden separately (e.g. Bédard et al., 2001; Gupta, 1999; Novak & Guest, 1989).

In the current meta-analysis, CBT was found to have a significant positive effect on caregivers’ engagement with adaptive coping methods and dysfunctional thoughts relating to the role (see p 28 & 29). Of all the outcomes evaluated, CBT was found to have the largest effect on dysfunctional thoughts. This may not be unexpected given that dysfunctional thoughts have a central role within the cognitive behavioural model. However, the impact of CBT on adaptive coping was more modest, with a smaller effect size found for adaptive coping compared to dysfunctional thoughts (see p29). Engagement in adaptive coping may be linked to the presence of dysfunctional thoughts about caregiving, particularly appraisals of family members’ obligation to provide care (Montorio et al., 2009). More modest outcomes for adaptive coping may be established if interventions have not explicitly addressed the cognitive barriers to self-help and self-care. Existing systematic and meta-analytic reviews had not considered the impact of CBT on the coping and dysfunctional thoughts of caregivers (e.g. Brodaty et al., 2003; Chien et al., 2011; Goy et al., 2010; Pinquart & Sorensen, 2006; Selwood et al., 2007).

Overall within the research evaluating caregiver interventions, there has been little exploration of the specific components of interventions that facilitate change (Schoenmakers et al., 2010). Given that cognitive behavioural therapy aims to alleviate distress by facilitating more adaptive cognitive and behavioural responses to stressors, changes in these outcomes may have been expected (Losada et al., 2006). Thus, more adaptive coping and cognitive belief systems may facilitate more positive
outcomes in depression, mental health, and subjective burden. Although the mechanisms of change have not explicitly been explored, links have been established between dysfunctional thoughts and coping, and caregiver mental health. For instance, dysfunctional thoughts have been found to be predictive of clinically significant depression, burden and greater distress (Arai et al., 2000; Knight & Sayegh, 2010; Losada et al., 2010; Montoria et al., 2009; McNaughton et al., 1995). Dysfunctional thoughts have been suggested to function as barriers to more adaptive coping methods (Montoria et al., 2009). Although this has not been explicitly evaluated in research studies, an association has been established between dysfunctional thoughts about caregiving and dysfunctional coping methods, such as avoidance, suppression of the needs of the caregiver, and expressed emotion (Croog et al., 2006; Muela et al., 2001; Shaw et al., 2003; Montorio et al., 2009). Help seeking has also tended to be more prevalent in caregivers experiencing less distress (Robinson et al., 2005; Gallagher-Thompson et al., 2003; Grossfeld-Schmitz et al., 2010).

Given the small number of studies evaluating dysfunctional thoughts and adaptive coping (k=5-8), analyses could not be undertaken to determine the extent to which changes in emotional outcomes were associated with changes in dysfunctional thoughts and adaptive coping. However, significant improvements were noted across all outcome variables (see p 28 & 29). It cannot be assumed that more adaptive functioning in caregivers lead to improvements in psychological well-being. Given that significant effects were established for outcomes evaluating caregiver emotional distress and coping and coping and though patterns, these findings would not disconfirm this theory. If the interventions did not facilitate changes in the psychological well-being of caregivers through the promotion of more adaptive functioning, significant effect size might have been expected across one but not both
of these domains. Further research would be required to evaluate the mechanisms of change.

4.2 Predictive value of care context and caregiver characteristics

The findings of this review, established no significant differences in caregiver outcome according to gender. However, the number of male participants was relatively low across the included studies. The included studies did not tend to evaluate the impact on caregiver outcomes according to the caregiver gender. The exploration of gender differences is therefore very difficult to quantify in an unbiased way.

The method used in this review has been previously utilised in the meta-analysis by Chien et al. (2011). The impact of gender on caregiver outcomes was considered by evaluating the effect of the proportion of female participating in the study outcomes. This method was used in the meta-analysis by Chien et al. (2011). However, it is reliant on studies having recruited different numbers of male and female participants. Recruitment discrepancies were apparent in all of the included studies. However, gender differences may have been masked by the method of analysis if the discrepancy was not significantly great or the impact of gender was relative small.

Contrary to the findings of Chien et al. (2011), this review found that no significant differences in effects sizes for the impact of CBT on depression according to the proportion of female participants. Chien et al. (2011) reported that studies with a larger number of female participants found significantly larger effect sizes for the impact of caregiver interventions on depression. The outcome for well-being was significantly poorer in studies with larger proportions of female participants (Chien et al., 2011). The outcomes of this meta-analysis and the review by Chien et al. (2011),
however, would not be directly comparable as Chien et al. (2011) did not evaluate cognitive behavioural interventions.

Given recent criticisms of the lack of specificity of intervention for caregivers from diverse ethnic backgrounds, the impact of CBT on caregiver emotional and functional outcomes was evaluated according to the proportion of Caucasian participating in the studies. The method was the same as used to evaluate the impact of gender on outcome. Statistically non-significant effects for the impact of CBT on burden, mental health and adaptive coping were found according to the proportion of caregivers participating in a study who were from a Caucasian ethnicity (see table 8). However, few of the included studies reported the participants’ ethnic background. Only three studies, Burgio et al. (2003), Belle et al. (2006) and Gallagher-Thompson et al. (2008), employed sampling methods that allowed recruitment of equal samples of caregivers from different ethnic backgrounds. These studies specifically tailored interventions to be culturally sensitive. Given the relatively small number of participants and the similarity in the proportions of participants recruited from a range of ethnic background, the method of analysis may not have been sufficient to determine any differences in outcome. Furthermore, the studies reporting caregiver ethnicity had tended to use culturally sensitive interventions. Significant differences may not have been found according to the ethnicity of the caregiver as the impact of CBT may therefore have been equal for all caregivers. However, to date, no comparative studies have explored whether additional gain is derived from culturally sensitive CBT for caregivers. In the general population culturally sensitive CBT has been established as having improvements in depressive symptomatology, attenuation and overall intervention satisfaction (Hwang et al., 2006; Interian & Diaz-Martinez, 2007; Sue et al., 1991; Miranda et al., 2003). Further exploration of tailoring
interventions to caregiver subpopulations would be beneficial given that CBT has been rated as a more credible intervention compared to brief psychodynamic therapy or counselling by individuals with an Asian or African American ethnical background (Cooper et al., 2007; Wong et al., 2003).

It has been suggested that tailoring caregiver interventions may be beneficial according to the type of dementia experienced by the care recipient (Sorensen & Conwell, 2011). However, the current review established that significant effect sizes on depression, burden and mental health difficulties were associated with CBT that included caregivers of individuals with a range of types of dementia when compared to interventions focused on carers of an individual with Alzheimer’s disease (see table 7). These findings may relate to the differences noticed in the focus of the cognitive behavioural interventions. It was noticed that the studies included in this review had one of two aims; alleviating emotional distress or managing behavioural and cognitive responses to behavioural manifestations of dementia. Tailoring of interventions in accordance with the type of dementia may only be required when the aim or one of the aims of CBT is to develop more adaptive methods of managing problematic behaviours displayed by the care recipient. When the goal of the intervention is to alleviate emotional distress, tailoring interventions by dementia type may be less necessary as the general techniques required are applicable to a range of situations or stressors. Subsequently, commonalities are noted between the general techniques utilised across interventions for caregivers and individuals with mental health difficulties in the general population (Hunot et al., 2007; Losada et al., 2010). In part, this may contribute to the finding that larger effects were determined for mixed caregiver participant groups. Notably, no significant between group differences were found for adaptive coping or dysfunctional thoughts. Further research would be
required to ascertain when adapting interventions for caregiver subpopulations provides additional benefit.

Overall, the relationship between the caregiver and care recipient was not found to be predictive of the outcome. No significant associations were established between the proportion of spouse caregivers and changes in depression, burden, mental health difficulties, adaptive coping or dysfunctional thoughts. These findings are reflective of those established by Chien et al. (2011) which indicated that the percentage of spousal caregivers was not significantly predictive of the outcomes of support and educational group interventions on well-being, burden, or depression, with correlation coefficients and standard errors of 0.01 or less. However, a recent meta-analysis established that spousal caregivers reported greater symptoms of depression and poorer psychological well-being than individuals who provide care for a parent or parent-in-law (Pinquart & Sörensen, 2011). Given these findings, it might have been expected that greater effects would have been found with a higher proportion of spouse caregivers. Compared to individuals caring for a parent, spouse caregivers are typically older (Pinquart & Sörensen, 2011). Evidence has been established which suggests that the emotional experiences of older and working adults differ.

In the current review, the percentage of participants caring for a parent with dementia was also not associated with any outcomes of psychological health, with the exception of burden. CBT was found to have a larger effect on burden for intervention studies with a higher number of adult child caregivers (see table 8).
4.3 Predictive value of intervention characteristics

Effects of cognitive behaviour therapy for caregivers on depression, burden, mental health difficulties, and dysfunctional thoughts were not predicted by the length of the intervention, either in terms of the total number of sessions or duration of treatment time overall. However, a negative correlation was established between the total numbers of sessions received by caregivers on the variable adaptive coping (see table 3). Interventions delivered over a longer period may themselves been perceived by caregivers as a stressor. Caregiving places a significant demand on the time of caregivers (Weiss et al., 2005). Attending an intervention may be perceived as increasing the pressure on caregivers. An intervention that does not adequately take into consideration the needs of the caregiver may be perceived as less credible, with the coping strategies introduced in the intervention not being utilised. Alternatively, the needs of the caregiver may change over the course of longer interventions so that these strategies may no longer be considered useful by the caregiver. Fluctuations in the ability of the caregiver to coping may be expected given that dementia is progressive and the role changes with the progression of the disease (Zarit, 1996). These changes may be apparent in the outcomes of longer interventions, as caregivers may experience greater a greater number of stressors over time. Alternatively the focuses of longer interventions may be different. However, it was notable that these findings were not established when the total intervention duration in hours was evaluated as predictive of outcome. Sessions typically lasted between one and half to two hours. However, the delivery of some interventions was less intensive, with a shorter sessions conducted over a longer period of time, such as the intervention in the study by Steffen (2000).
However, these findings may not be directly related to the length of the intervention but another commonality amongst the interventions with a larger number of sessions. For instance these particular interventions may have failed to adequately consider the role of dysfunctional thoughts when encouraging the use of adaptive coping strategies. Caregiver’s perceptions of the intervention may be particularly important given evidence to suggest that dysfunctional thoughts function as barriers to caregivers engaging in adaptive ways of coping (Montorio et al., 2009). The intervention used by Losada et al. (2010) was specifically tailored to modify the dysfunctional beliefs that act as barriers. The most fundamental of these dysfunctional thoughts are the perceptions that care should only be provided by family members and supportive services are inadequate to care of the needs of the care recipients (Arai et al., 2000; Losada et al., 2010; Montorio et al., 2009; Pinquart & Sörensen, 2006). The presence of these thoughts may lead caregivers to perceive engagement in an intervention as an indication of their failure as a caregiver. If a caregiver continues to endorse these particular dysfunctional thoughts, it is unlikely any benefit will be achieved from the intervention. Further exploration of variables impacting of the efficacy of CBT interventions would be required to adequately explore the impact of intervention length or the role of dysfunctional thoughts in restricting engagement in an intervention.

Contrary to the findings of the current meta-analysis, negative associations between intervention length and outcome have not been determined for other caregiver interventions. Chien et al. (2011) found that group support and educational interventions of eight sessions or more or duration over fifteen hours had significantly larger effects on psychological well-being and depression, with between group variance of 7.17 and 18.29, \( p < 0.05 \), than interventions of a shorter duration.
The type of control condition used by the study did not influence the effects of CBT on mental health difficulties, adaptive coping or dysfunctional thoughts. However, the effects of CBT on depression were only significant when CBT was compared to a non-active control condition. This suggests that CBT was not significantly more effective than minimally active interventions. Whilst the impact of CBT on burden was greatest when non-active conditions were used, a significant effect was found for minimally active interventions.

No differences were associated between outcomes for caregiver depression, burden, mental health or dysfunctional thoughts and intervention delivery, namely group, individual, technology-based self-help or mixed method delivered CBT. However, delivery method was predictive of adaptive coping (see table 5). The largest effects associated with individual interventions when compared to group or mixed delivery methods (see table 4). Individual interventions may be more specifically tailored according to the needs of the individual caregiver and care context.

Evidence was established to suggest CBT delivery is time sensitive, with larger effects on depression, mental health and dysfunctional thoughts found for studies with a larger number of participants having provided care for 37 to 43 months. For adaptive coping, larger effect sizes were found between 64 to 69 months (see table 5). These findings would suggest that CBT may be most effective when delivered three years after caregivers began providing care to a relative with dementia.

The cognitive behavioural interventions evaluated in the included studies were targeted to alleviating caregiver emotional distress, such as depression, anxiety and anger, or designed to increase behavioural skills in managing behavioural symptoms of dementia. The findings of the current meta-analysis suggest that these interventions can be maximally useful when applied in later stages of caregiving when caregivers...
Caregiver Interventions

are in need of coping strategies that CBT can equip people with. CBT may not be appropriate as an intervention for post-diagnostic support or facilitating acceptance with the diagnosis.

Chien et al. (2011) did not evaluate the impact of caregiver interventions according to the length of time caregivers had provided care. However, larger effect sizes for the impact of interventions on caregiver emotional well-being were established for interventions studies with a larger number of participants caring for an individual with cognitive difficulties consistent with the mid-stage of disease progression when compared to studies with more participants caring for an individual with early stage dementia (Chien et al., 2011). These differences were not found to be significant between these groups of caregivers.

Accommodation to any role involves a series of transitions (Miller, 2010). The caregiver role may involve a series of transitions with different focuses and tasks, such as acceptance and role accommodation, provision of care and coping emotional with the strain of caregiving, and role termination and bereavement (Piipainen & Whitlatch, 2011). To date, the aims of the cognitive behavioural interventions for caregivers have not been tailored towards facilitating adaptive transition through these stages. However, it would be predicted that interventions are more effective when tailored to the tasks and stressors of each transitional stage of the role. It may be possible to design CBT to match the needs of caregivers and the tasks of caregiving across the disease progression. However, to date, little research has been undertaken to consider the timing of interventions (Schoenmakers et al., 2010).
4.4 CBT compared to other therapeutic caregiver interventions

The findings of the current meta-analysis suggest that CBT is an efficacious intervention for alleviating caregiver emotional distress and facilitating more adaptive coping.

This review did not explicitly evaluate any potential differences between the effects of CBT compared to alternative types of interventions. However, contracting the findings of this review with existing systematic and meta-analytic reviews provides a sense to the effectiveness of CBT compared to other interventions.

4.4.1 Educational Interventions.

Evaluations of educational interventions with a didactic approach have had little impact on caregiver depression, burden or well-being (Acton & Kang, 2001; Pinquart & Sørensen, 2006). However, psychoeducation, which incorporates experiential learning, has been established as having significant effects on depression, with a slightly more modest size of effect, -0.36, compared to the cognitive behaviour interventions considered within this review, $g^* = -0.55$ (Pinquart & Sørensen 2006; Chien et al., 2010). Psychoeducational interventions have often been designed based on the cognitive behavioural model. This has not consistently occurred, with interventions also being developed from the psychosocial, behavioural and stress processing theories (e.g. Gavrilova et al., 2009; Mittelman et al., 2004; Giltin et al., 2001). Caregiver intervention studies have been criticised for not making explicit the theoretically grounding of interventions (Knight et al., 1993; Selwood et al., 2007). This has introduced difficulties in the classification of interventions within empirical reviews, with overlap being apparent between intervention categories (Goy et al., 2010; Schoenmakers et al., 2010). Thus, some similarity in the impact of cognitive behavioural and psychoeducational interventions may be expected.
However, consistent effects on burden were not established for psychoeducational interventions unlike CBT (Pinqurt & Sørensen 2006; Chien et al., 2011).

**4.4.2 Skills training interventions.**

Behavioural modification training is focused on assisting caregivers to manage the behavioural manifestations of dementia (Selwood et al., 2007; Goy et al., 2010). These have tended to be grounded in behavioural theory, but have also incorporated some techniques from cognitive therapy. For instance, the interventions designed by Marriot et al. (2000) and Martín-Carrasco et al. (2009) required caregivers to monitor and challenge appraisals of and reactions to behavioural symptoms of dementia. As with other types of interventions, overlap exists in the methods of classification (Knight et al., Goy et al., 2010). Consistent effects, however, have not been established for the impact of behavioural management on caregiver burden. The findings of the current meta-analysis suggest that CBT is efficacious in improving caregiver burden (Selwood et al., 2007). Whilst CBT is effective for alleviating mental health difficulties across all methods of delivery, behavioural management training was only found to have significant gains when delivered in individual interventions (Goy et al., 2010). This suggests CBT may be a more effective intervention than behavioural management training in alleviating caregiver psychological distress.

Another type of skills training, specifically caregiver coping skills interventions, have also been incorporated as a component of cognitive behavioural interventions. However, as with behavioural modification skills training, coping skills training on its own is not solely based on the cognitive behavioural model but has also been grounded in behavioural theory or psychosocial models (e.g. Farran et al., 2007; Simpson & Carter, 2010; Tremont et al., 2008). Given the outcomes of this current
review, CBT appears to evidence a more significant impact on caregiver psychological health in comparison to coping skills training interventions. Whilst coping skills training has been found to be effective in reducing depression, limited evidence was established to suggest this intervention had significant positive impact on burden (Selwood et al., 2007).

### 4.4.3 Supportive counselling.

The findings of the current meta-analysis suggest cognitive behavioural interventions are more effective than supportive counselling for alleviating caregiver distress. No significant effect on burden or depression has been established in prior reviews for this intervention (Chien et al., 2011; Pinquart & Sörensen, 2006). Conversely, significant effects were established for CBT.

### 4.4.4 Multicomponent Interventions.

Meta-analyses evaluating the impact of MCI have found these types of interventions to have inconsistent effects on caregiver affect. For instance, the meta-analyses by Pinquart and Sorensen (2006) and Schoenmakers et al. (2010) reported that MCI did not have statistically significant effects on burden, well-being or depression. However, Acton and Kang (2001) and Gitlin et al. (2003) found significant, small to large effect sizes for the impact of MCI on burden. This may reflect that the lack of homogeneity found in this interventions category.

CBT has demonstrated more consistent effects, with significant effect found on depression, burden, mental health, dysfunctional thoughts, adaptive coping, and well-being by this review and Pinquart and Sorensen (2006). These findings would suggest that CBT may be a more effective in improving caregiver psychological distress than MCI.
4.5 Methodological weaknesses of CBT studies

Within the research evaluating interventions for caregivers, it has been highlighted that studies are likely to be evaluating a specific subpopulation of the caregiver population as a whole (Robinson et al., 2005; Bullock et al., 2003; Gallagher-Thompson et al., 2003; Grossfeld-Schmitz et al., 2010; Knight et al., 1993; Wettstein et al., 2004). Caregivers who experience the greatest distress are least likely to access supportive interventions (Dura & Kiecolt-Glaser, 1990; Robinson et al., 2005). A number of the studies included in the current MA, such as Au et al. (2010), Burgio et al. (2003) and Losada et al. (2011), have broadened the range of recruitment methods used and have preferentially focused on recruiting caregiver minority subpopulations. This has primarily focused on increasing caregiver participants from a range of ethnic backgrounds. However, it remains likely that the effects of cognitive behavioural interventions are only being evaluated for a small proportion of caregivers.

Within cognitive behavioural interventions, variability was observed in the focus and delivery. Three core intervention aims were identified in the studies evaluated in this review. Specifically, interventions focused on alleviating caregiver emotional distress, such as anxiety, anger or depression, increasing adaptive behavioural and cognitive responses to behavioural manifestations of dementia or combined both of these components, see table 2. The impact of interventions has been evaluated generally for interventions which aim to increase care skills or emotional coping. However, these have included interventions ground in a range of theoretical approaches. Until recently, empirical reviews have focused on examining the impact of a range of broadly defined caregiver interventions. The quantity of available studies evaluating such interventions and increasing awareness of methodological flaws in the
research has lead to a number of reviews focusing on specific types of interventions (Goy et al., 2010; Knight et al., 1993; Lee & Cameron, 2008; Powell et al., 2008). However, to date, the differential effects of cognitive behavioural interventions for managing the behavioural manifestations of dementia and emotional coping have not been examined. Such analysis was not undertaken in the current review as calculations of the effect sizes may have been biased by the relatively few numbers of included studies.

Despite variation in the focus of CBT, interventions have not tended to be matched to the difficulties experienced by caregiver. For instance, caregiver inclusion to CBT for depression has not been dependant on the distress a caregiver experiences reaching the threshold for clinical significance (e.g. Au et al., 2010; Gallagher-Thompson et al., 2008; Coon et al., 2003). This would be appropriate given the higher prevalence of mental health difficulties within the caregiver population (Mitrani et al., 2006; Schulz et al., 2000). In addition, interventions aiming to establish more adaptive reactions to the behavioural manifestation of dementia have not consistently evaluated the impact on the care recipient or care practices. Thus, outcome measures do not always map specifically onto the goals of the intervention. Exploring the impact of interventions on care is particularly important as caregiver dysfunctional thoughts, specially relating to the functional ability of the care recipient, can lead to inappropriate involvement in care (Harvath, 1994; Izal et al., 2005; Mittelman et al., 2003; Zanetti et al., 1995). This could be detrimental to the well-being or safety of the care recipient. Consideration of the impact of CBT on care practices would, therefore, be a useful in future research.
Overall, there has been little consideration of the method of delivery or the timing or duration of specific interventions. However, evidence has been found in the current meta-analysis and previous empirical reviews to suggest that these variables significantly contribute to the impact of the intervention (Chien et al., 2011; Gitlin et al., 2003; Pinquart & Sorensen, 2006). As previously mentioned this meta-analysis found CBT to be more effective when delivered in a particular time frame, with additional gains found in adaptive coping for individually delivered interventions (see p. 34, 37 & 50). Whilst this review did not establish intervention duration as predictive of outcome, the review by Chien et al (2011) established that caregiver interventions were more effective when delivered across 8 or more sessions for 16 or more hours in total. Subsequently, intervention design is required to be consistent with the fluctuating needs of caregivers across the care role, with interventions sensitive to critical transitional periods. Further research is needed to evaluate the potential impact of CBT on caregiver distress across the lifespan on the care role.

4.6 Methodological weaknesses of this review

From the search process, a relatively small number of studies were identified as consistent with the inclusion criteria. This was particularly problematic as publication biases were identified across all of the outcome variables, indicating that the effect sizes are not an accurate representation of the population effect sizes (see sections 2.4.1 to 2.4.5). A number of difficulties may explain biases in the representativeness of the sample of CBT studies. For instance, compared to other types of interventions, CBT has been used to alleviate caregiver distress fairly recently. Fewer studies, particularly large scale studies. This has been suggested to result in publication biases as larger studies tend to report larger effect sizes (Ellis, 2010).
In addition, the search process did not identify any unpublished literature and tower of babel bias was introduced as only studies written in English were considered. Grégoire et al. (1995) found evidence to suggest that researchers who either do not speak English or for whom English was a secondary language tended not to publish negative or non-significant results to English language journals. This was termed the tower of babel bias (Grégoire et al., 1995). Studies that have not been published have also been found to have significantly smaller effect sizes than published studies (Lipsey & Wilson, 1993). Further difficulties were introduced as research studies inconsistently reported the theoretical grounding of interventions or provided limited information about the intervention or control designs. Whenever possible further classification was sought, however, some intervention studies may have been inappropriately excluded. This is likely to have been further limited by the lack of multiple researchers independently rating the relevance of the literature during the search process.

A number of the studies used multiple measures to evaluate the same outcomes or drew comparisons between two types of CBT interventions and one control condition. This introduces difficulties of outcome dependency. Insufficient information was available to utilise Rosenthal and Rubin’s (1986) equation to combine effect sizes. This equation, shown below, has been suggested as the most reliable method of combining dependent outcomes (DeCoster, 2009).

\[
\text{combined } g = \frac{\sum g_i}{\sqrt{pm^2 + (1-p)m}}
\]

Where \(g_i\) is the effect size \(i\)th measures, \(p\) is the typical intercorrelation between measures, and \(m\) is the number of response measures being combined.
Calculation of the combined effect size is, therefore, reliant on the inter-correlation between responses being available. This has been seldom reported by researchers (De Coster, 2009). Given that adjustments for dependent outcomes do not appear to have been undertaken by the previous reviews, intervention studies may not report the intercorrelation between responses as the significance of this figure may not be known. Given that this equation could not be used, the current MA undertook multiple calculations of the effect sizes for the variables of burden, depression and mental health. The average and pooled effect sizes were computed for the dependent outcomes. The latter was adjusted for between and within-study variance. These multiple outcomes were also entered individually into calculations of effect. From these, it was determined that calculating the adjusted pooled effect size for these dependent outcomes provided the most modest estimate. These were subsequently used in the calculations to limit over-estimation of effects. Reference was made to prior meta-analyses evaluating other types of caregiver interventions. However, the studies did not outline the methods used to overcome this difficulty.

The current review considered the impact of CBT compared to minimally active interventions, such as waiting list, standard care, minimal support control conditions. This approach was utilised in the meta-analysis by Pinquart and Sorensen (2003) to limit the possibility of under-estimating the impact of CBT. However, it would have been beneficial in this review to differential the impact of CBT compared to minimal active conditions and other interventions, such as psychosocial interventions or psychotherapy, to limit the possibility of over-estimation of the effect.

The validity and reliability of the quality assurance measure was unknown as the tool was adapted to be specific to methodological weaknesses previously highlighted in earlier meta-analyses (Knight et al., 1993; Pinquart & Sorensen, 2006).
However, Olivo et al. (2007) indicated that the processes used to evaluate the validity and reliability of standardised measures was often insufficient. These measures may, therefore, not be as accurate as reported.

4.7 Clinical Implications of the current meta-analysis

Cognitive behavioural interventions for caregivers have substantial potential. The prevalence of mental health difficulties has been found to be higher for individuals caring for a relative with dementia that in the general population (Ory et al., 2000; Pinquart & Sorensen, 2003). This has considerable consequences for the provision of support for health, social and voluntary services specialising in dementia care, particularly as the prevalence of dementia is expected to increase over the next 40 years (Kinsella & Wan, 2009).

The current meta-analysis indicated that CBT is efficacious as an intervention for alleviating the symptoms of depression, burden and mental health difficulties for dementia caregivers. However, the effects of CBT extend beyond mere symptom reduction. CBT was found to be efficacious in facilitating more adaptive appraisals of the caregiving and means of coping in caregivers. This intervention provides caregivers concrete strategies to equip caregivers in coping with the emotional responses to caregiving and behavioural manifestations of dementia. However, the potential benefits may extend further.

A significant proportion of caregivers do not seek support (Brodaty et al., 2005). However, these caregivers tend to experience the greatest distress (Brodaty et al., 2005; Dura & Kiecolt-Glaser, 1990; Robinson et al., 2005). Dysfunctional thoughts have been suggested to function as barriers to adaptive methods of coping, such as help seeking (Montoria et al., 2009).
A trend has been observed for caregivers to perceive that care should be provided within the family, with external services viewed as being insufficient to provide adequate personalised care to their relative (Losada et al., 2006; Losada et al., 2010; Montoria et al., 2009). Access to services could, therefore, be delayed, with engagement in such services being viewed as an indication of failure. Given the emphasis on dysfunctional thoughts in the development and maintenance of distress, CBT may be well placed as an intervention for caregivers who do not typically access support.

Caregiver intervention studies have tended to consider the implementation of a single intervention. Compared to other caregiver interventions, the impact of CBT appears promising (Pinquart & Sorensen, 2006). However, it would seem unlikely that a single intervention, delivered at one time point would be effective as a means of alleviating the distress experienced by caregivers given the complexity and fluidity of the role. A stepped and integrated approach to service provision for caregivers may provide the greatest benefit, with caregiver interventions delivery tailored to the needs of the caregivers and stage of transition within the care role.

Evidence was established in the current review to suggest that existing cognitive behavioural interventions may have the largest effect when delivered in later stages of caregiving. However, CBT may have the potential to derive benefit to caregivers at other stages of the role if tailored to the tasks of critical transitional periods.
4.8 Summary

Cognitive behaviour interventions for caregivers have shown promise in facilitating more adaptive methods of coping. Evaluations of CBT are at a relatively early stage compared to other types of interventions for caregivers. Further research is required to develop a stepped and tailored approach to meet the psychological needs of caregivers across the different stages of the care provider role. It is unlikely that a single intervention would adequately meet these needs given the complexity and fluidity of the caregiver role. As one of these interventions, cognitive behaviour therapy has shown promise in contributing to the alleviation of caregiver distress. Improving access to the support for the large proportion of caregivers not accessing services would be an important consideration for future research.
Efficacy of Cognitive behavioural interventions for informal dementia caregivers: a meta-analysis
Efficacy of Cognitive behavioural interventions for informal dementia caregivers: a meta-analysis

**Purpose:** This review evaluates the impact of intervention studies evaluating cognitive behaviour therapy for informal dementia caregivers.

**Methods:** Meta-analytic methods were used to integrate the findings of fourteen studies published between 2000 and 2011. Meta-regression and analysis of variance were used to evaluate the impact of caregiver and intervention characteristics on the outcomes. **Results:** Significant effects sizes were found for the impact of CBT on depression, burden, and mental health difficulties, $g^* = -0.55$, 95% CI [-0.92, -0.19], $g^* = -0.37$, 95% CI [-0.57, -0.17], and $g^* = -0.54$, 95% CI [-0.78, -0.30], respectively. CBT facilitated more adaptive coping, with significant effects on caregiver adaptive coping and dysfunctional thoughts, $g^* = 0.48$, 95% CI (0.02, 0.24) and $g^* = -1.33$, 95% CI (-2.22, -0.44). The impact of CBT on caregiver outcomes was associated with the nature of the study control condition, and the intervention delivery, timing and specificity to dementia type. Caregiver ethnicity and gender were not predictive of the CBT outcome. **Implications:** CBT is an efficacious intervention for alleviating caregiver distress and facilitating more adaptive coping responses. Future research needs to consider CBT as part of multi-intervention approach tailored to the needs of caregivers across the disease progression.

**Keywords:** caregiver, dementia, cognitive behavioural therapy

Word Count: 5,918
1.0 Introduction

In the United Kingdom, there are estimated to be 700,000 people with dementia (Knapp et al., 2007). A sharp rise is expected in this figure over the next 40 years (Kinsella & Wan, 2009). This has wide implications for dementia services supporting families experiencing dementia (Wimo & Prince, 2010).

1.1 Impact of caregiving

Caring for a family member with dementia has been identified as a major source of stress, with caregivers having a higher prevalence of mental and physical health, and family relational difficulties than the general population (Ory, Yee, Tennstedt & Schulz, 2000; Pinquart & S rensen, 2003; Mitrani et al., 2006; Vitaliano, Young & Zhang, 2004). A wide range of psychosocial and financial consequences have also been identified (S rensen & Conwell, 2011; Vitaliano, Zhang, & Scanlan 2003). However, caregiving has also been identified as an opportunity for personal growth and to create meaning in life (Cohen, Colantonio, & Vernich, 2002; Peacock et al., 2010; Tarlow et al., 2004).

1.2 Cognitive behavioural model of caregiver distress

The cognitive behavioural model suggests individuals’ representations of the world, the self and future are shaped by their sociocultural context and life experiences (Beck, Rush, Shaw & Emery, 1979; Laidlaw, Thompson, Dick-Siskin, & Gallagher-Thompson, 2003). These schemas guide emotional and behavioural responses (Beck et al., 1979; McGinn & Young, 1996). Adaptive thought patterns are linked to adaptive functioning, with caregivers with greater self efficacy experiencing less distress (Beck, 1995; Márquez-González, Losada, López, & Penacoba, 2009; Romero-Moreno et al., 2011).
However when cognitive systems are maladaptive, individuals experience rigid, unrealistic beliefs, dysfunctional automatic thoughts, emotional distress and maladaptive coping (Montorio, Losada, Izal & Marquez, 2009; McNaughton, Patterson, Smith & Grant, 1995). These dysfunctional thoughts function as cognitive barriers, restricting caregivers’ ability to engage in adaptive ways of coping through three interlinked pathways; inhabitation of help seeking, appropriate expression of negative affect and level of care involvement (Montorio et al., 2009).

1.2.1 Inhibition of help seeking.

An individual is unlikely to be able to act as sole care-provider given the increasing needs of the care recipient (Brookmeyer, Johnson, Ziegler-Graham & Arrighi, 2006). However, service utilisation has been relatively low and caregivers experiencing greater distress are least likely to engage (Brodaty, Thomson & Fine, 2005; Dura & Kiecolt-Glaser, 1990; Robinson, Buckwalter & Reed, 2005).

Dysfunctional beliefs about the family’s obligation to care limits help seeking and contribute to caregivers’ experiences of an overwhelming sense of responsibility to provide care (Mittelman, Epstein & Pierzchala, 2003). Distress is managed by striving for role perfection, with the caregiver setting unrealistic care goals and suppressing their needs to fulfil these contingencies (Arai, Sugiura, Miura, Washio & Kudo, 2000; Lindoerfer, 1991). Seeking of support is, therefore, perceived as indication of failure to fulfil the care role (Losada et al., 2010).

1.2.2 The expression of negative affect.

Dysfunctional thoughts limit the expression of negative emotional responses to the caregiver role (Montorio et al., 2009). The time demands of caring can restrict caregivers’ involvement in other valued aspects of life resulting in feelings of dissatisfaction, resentment or hostility (Croog, Burleson, Sudilovsky & Baume, 2006;
Shaw et al., 2003; Weiss, González, Kabeto, & Langa, 2005). However, an unrealistic sense of loyalty to the care recipient limits adaptive expression of these emotional responses (Gallagher-Thompson et al., 2003). The restriction of adaptive emotional expression is associated with greater stress, burden and depression (Croog et al., 2006; Muela, Torres & Pelaez, 2001).

1.2.3 Level of involvement in care.

A lack of knowledge of dementia leads to the tendency for caregivers to develop unrealistic expectations of the care recipient’s cognitive and functional abilities (Farran, Louskissa, Perraud & Paun, 2004; Georges et al., 2008). Appraisals of the care recipient’s abilities contribute to the level of support or supervision provided by the caregiver (Montorio et al., 2009). Misattributions lead to insufficient or excessive care provision which may adversely affect the safety and well-being of the care recipient and caregiver (Lindoerfer, 1991). These beliefs are associated with caregiver expressed emotion, the degree to which an individual is emotionally involve, criteria or hostile, and less effective coping (Heru, Ryan & Iqbal, 2004; Tarrier et al., 2002).

1.3 Cognitive behaviour therapy

Given the significance of dysfunctional thoughts in the development of distress, cognitive behaviour therapy (CBT) has been considered as intervention for caregivers (Pinquart & Sörensen, 2006). Empirical reviews have not tended to focus on the impact of CBT as a discrete intervention (Schoenmakers, Buntinx & Delepeleire, 2010). This review will use meta-analytic techniques to provide an updated evaluation of the efficacy of CBT for informal dementia caregiver distress. This review will seek to identify caregiver and intervention variables that are significantly predictive of outcome (Chien et al., 2011).
2.0 Methods

2.1 Search Method

Electronic databases were searched in June 2011 for relevant literature, including MEDLINE, Embase, CINAHL, PsycINFO, Psychology and Behavioral Sciences Collection, and The Cochrane Library. The search terms were caregiv* or carer, and dement* or Alzheimer’s disease, and cogniti* behav* therapy, cogniti* behav* intervention, family cogniti* behav* therapy, or psychoeducation. Asterisks were used as it allowed the identification of all relevant truncated words.

Additional studies were identified by cross-referencing and hand searching journals identified by existing systematic reviews as sources of frequently published caregiver intervention studies (Knight, Lutzky & Macofsky-Urban, 1993; Pinquart & Sorensen, 2006). These included The Gerontologist, the Journals of Gerontology, Journal of Gerontological Social Work, Journal of Gerontological Nursing, Journal of nursing research, Psychology and Aging, and Aging and Mental Health. Literature relevance was determined against an established set of inclusion criteria. This search was updated in November 2011.

2.2 Inclusion Criteria

This meta-analysis considered randomised control trials evaluating the impact of CBT on informal dementia caregivers who provide care in the community. CBT was classified as a structured, time-limited approach applying cognitive and behavioural techniques including psychoeducation, management of physiological arousal, behavioural modification, problem solving, and the modification of maladaptive thoughts (Gallagher-Thompson & Steffen, 1994; Laidlaw et al., 2003; Pinquart & Sorensen, 2006). Outcomes were focused on caregiver affect, including burden, depression and measures of psychological morbidity and well-being (Gallagher & Coon, 2007).
Dysfunctional thoughts and adaptive coping were also considered (Losada et al., 2006). Outcome data were required to be in a format that could be converted into effect sizes.

Control conditions were limited to non-active or minimally active interventions, such as waiting list, usual care or minimal support. Studies written in English were included.

**2.3 Assessment of methodological quality**

The methodological quality of the intervention studies was assessed using a domain based, amalgamated set of standards developed from methodological criticisms of the caregiver intervention studies and existing quality assurance (QA) tools (e.g. Centre for Research and Development [CRD], 2009; Higgins & Green, 2011; Scottish Intercollegiate Guideline Network [SIGN], 2008; Verhagen et al., 1998).

Existing QA measures as these are not specific to methodological difficulties in this area (Knight et al., 1993). The assessment of QA tools validity and reliability have been criticised as inadequate and the scoring systems used increase bias through the placement of arbitrary ‘weights’ on particular methodological components (Higgins & Green, 2011; Olivo et al., 2007).

**2.4 Data Extraction**

Intervention, caregiver and care recipient characteristics were extracted and summarised, as follows:

Intervention characteristics included the publication year, delivery method and duration of the intervention.

Caregiver characteristics included relationship to the care recipients, age, gender, ethnicity and length of caregiving.
Care recipient characteristics included the nature of the dementia diagnosis.

2.5 Data Analysis Strategy

Meta-analytic methods based on random effects models were utilised to convert reported statistics into standardised effects sizes (Hedge & Olkin, 1985). Effect sizes, hedge’s $g^*$, was calculated for each study outcome, correcting for baseline differences between conditions and controlling for within- and between-study variance (Hedges & Olkin, 1985). The comprehensive meta-analysis software (version 2, Biostat, Englewood, NJ) was used to calculate the weighted mean effect sizes for each outcome.

Some studies used multiple means to measure the same outcome or compared two CBT interventions to one control condition. Multiple calculations were undertaken including the use of average and pooled effect sizes for dependent outcomes to determine the variable effect size and calculating overall effect with the each of the interrelated outcomes separately. The most modest effect was selected to reduce the risk of over-estimating the population effect size.

Effect size homogeneity was evaluated using Cochran’s $Q$ and $I^2$ (Higgins, Thompson, Deeks & Altman, 2002). $I^2$ indicates the percentage of variance attributable to heterogeneity. Low, moderate and high heterogeneity are represented by $I^2$ values of zero, twenty-five or less, fifty, and seventy-five or more, respectively (Higgins, Thompson, Deeks & Altman, 2003). Publication bias was evaluated using a funnel plot, with trim and fill methods used to compute estimates of the true mean effect and variance (Duval & Tweedie, 2000). The practical significance of the effects was interpreted using the common language effect size (CLES; McGraw & Wong, 1992).
The predictive value of care, caregiver and intervention characteristics was evaluated on the outcome. For categorical data, between group difference was evaluated using a method based on analysis of variance. Single, weighted meta-regression was utilised to evaluate continuous variables.
3.0 Results

3.1 Search Process

The search retrieved 5175 articles, see figure 1. Ninety-nine per cent of identified articles did not meet inclusion criteria. Sixteen of the studies were evaluated for methodological quality. Two studies were excluded based of insufficient methodological design, with the studies lacking methodology clarity, control of intervention delivery and sufficient grounding in the cognitive behavioural model (Beauchamp, Irvine, Seeley & Johnson, 2005; Chang, 1999).

![Figure 1. Summary of search process](image)

3.2 Descriptive characteristics of the studies

The descriptive characteristics of the included studies are summarised in table 1. Around half of these evaluated the impact of group interventions and caregivers of an individual with Alzheimer’s disease. Intervention length ranged from 8 to 17 sessions. The majority of the 1550 participants were female, caring for either a spouse or parent.
Table 1.
Descriptive statistics of intervention and caregiver characteristics

<table>
<thead>
<tr>
<th></th>
<th>( N (%) )</th>
<th>( \bar{x} ) (SD)</th>
<th>range</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Caregiver Allocation</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CBT</td>
<td>851</td>
<td>60.8 (64.5)</td>
<td>11-261</td>
</tr>
<tr>
<td>Control</td>
<td>699</td>
<td>52.6 (63.1)</td>
<td>3-257</td>
</tr>
<tr>
<td><strong>Caregiver characteristics</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spouse</td>
<td>651 (42)</td>
<td>52.9 (49.5)</td>
<td>4 - 224</td>
</tr>
<tr>
<td>Adult child</td>
<td>744 (48)</td>
<td>65.0 (65.9)</td>
<td>7 - 246</td>
</tr>
<tr>
<td>Other</td>
<td>155 (10%)</td>
<td>10.4 (11.6)</td>
<td>0-34</td>
</tr>
<tr>
<td>female</td>
<td>1271 (82)</td>
<td>105.9 (114.3)</td>
<td>10 - 430</td>
</tr>
<tr>
<td>male</td>
<td>279 (18)</td>
<td>26.1 (24.7)</td>
<td>0 - 88</td>
</tr>
<tr>
<td>Mean Age</td>
<td></td>
<td>60.3 (3.2)</td>
<td>54 - 65</td>
</tr>
<tr>
<td>Educational attainment (years)</td>
<td></td>
<td>13.2 (1.0)</td>
<td>10 - 14</td>
</tr>
<tr>
<td>Length of care (months)</td>
<td></td>
<td>45.5 (10.1)</td>
<td>30 - 66</td>
</tr>
<tr>
<td><strong>Intervention Characteristics</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Duration</strong></td>
<td></td>
<td>( \bar{x} ) (SD)</td>
<td>range</td>
</tr>
<tr>
<td>Sessions</td>
<td>11.3 (2.7)</td>
<td></td>
<td>8-17</td>
</tr>
<tr>
<td>Time</td>
<td>16.4 (8.0)</td>
<td></td>
<td>1.5 – 26</td>
</tr>
<tr>
<td><strong>Delivery</strong></td>
<td></td>
<td>( k ) (%)</td>
<td></td>
</tr>
<tr>
<td>Individual delivery</td>
<td>1 (7)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group delivery</td>
<td>7 (50)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Technology based delivery</td>
<td>1 (7)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mixed methods of delivery</td>
<td>5 (36)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Intervention specificity</strong></td>
<td></td>
<td>( k ) (%)</td>
<td></td>
</tr>
<tr>
<td>female caregivers only</td>
<td>3 (21)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AD caregivers only</td>
<td>7 (50)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No limitations</td>
<td>4 (29)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note.* \( N = \) number of cases; \( k = \) number of intervention studies; \( \bar{x} = \) mean; SD= standard deviation
## Intervention Characteristics

<table>
<thead>
<tr>
<th>Control conditions</th>
<th>k (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waiting list</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>(36)</td>
</tr>
<tr>
<td>Minimal support</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>(43)</td>
</tr>
<tr>
<td>Standard care</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>(21)</td>
</tr>
</tbody>
</table>

*Note. N= number of cases; k = number of intervention studies; \( \bar{x} \) = mean; SD= standard deviation*
3.3 The effect of cognitive behavioural therapy for caregivers

Standard mean effect sizes were calculated for each outcome variable based on the weighted study effect sizes. Table 2 summarises these findings.

Table 2.

Intervention effects on caregiver burden, depression, mental health and adaptive coping

<table>
<thead>
<tr>
<th>Variable</th>
<th>$k$</th>
<th>N</th>
<th>$g^*$</th>
<th>95% CI</th>
<th>$Q$</th>
<th>$I^2$</th>
<th>CLES</th>
<th>$g^*$ adjusted for PB</th>
<th>Adjusted CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depression</td>
<td>11</td>
<td>708</td>
<td>-0.55**</td>
<td>-0.92, -0.19</td>
<td>93.40***</td>
<td>89.29</td>
<td>0.65</td>
<td>-0.80</td>
<td>-0.89, -0.73</td>
</tr>
<tr>
<td>Burden</td>
<td>11</td>
<td>681</td>
<td>-0.37***</td>
<td>-0.57, -0.17</td>
<td>20.87*</td>
<td>52.08</td>
<td>0.60</td>
<td>-0.20</td>
<td>-0.42, 0.02</td>
</tr>
<tr>
<td>Mental Health</td>
<td>13</td>
<td>840</td>
<td>-0.54***</td>
<td>-0.78, -0.30</td>
<td>64.26***</td>
<td>81.33</td>
<td>0.65</td>
<td>-0.68</td>
<td>-0.97, -0.40</td>
</tr>
<tr>
<td>Adaptive coping</td>
<td>8</td>
<td>634</td>
<td>0.48***</td>
<td>0.02, 0.24</td>
<td>22.41**</td>
<td>68.76</td>
<td>0.63</td>
<td>0.44</td>
<td>0.20, 0.68</td>
</tr>
<tr>
<td>Dysfunctional thoughts</td>
<td>5</td>
<td>212</td>
<td>-1.33**</td>
<td>-2.22, -0.44</td>
<td>37.38***</td>
<td>89.30</td>
<td>0.83</td>
<td>-1.64</td>
<td>-2.71, -0.58</td>
</tr>
</tbody>
</table>

Note. $k$= number of interventions; N= number of treated caregivers; $g^*$ = adjusted hedge’s $g$; 95% CI=95% confidence interval of the effect size; $Q$=test for homogeneity of effect sizes (significant effects indicate heterogeneity of the effect sizes); $I^2$= extent of heterogeneity of effect size (indicates % variance attributable to heterogeneity); CLES= common language effect size; $g^*$ adjusted for PB= trim and fill adjusted effects size, based on existence of publication bias; adjusted CI= trim and fill adjusted 95% confidence interval

$p<0.05$, **$p<0.01$, ***$p<0.001$. 
CBT was found to have a significant effect, $g^* = -0.55$, 95% CI [-0.92, -0.19], $p = 0.003$, on caregiver depression. A high degree of heterogeneity was established, $Q = 93.40$, $p < 0.001$, $I^2 = 89.29$. Adjusting for the presence of a publication bias, the effect size was estimated to be -0.80, 95% CI [-0.89, -0.73]. The CLES indicates that 65 per cent probability that a randomly selected caregiver who engaged in CBT participant would be less depressed post-intervention than a caregiver receiving minimally supportive interventions or no intervention.

A statistically significant effect size for the impact of CBT on burden was found of -0.37, 95% CI [-0.57, -0.17], $p < 0.001$. A moderate level of heterogeneity was found, $Q = 20.87$, $p = 0.02$, $I^2 = 52$. Adjusting for the presence of a publication bias, the effect size was estimated to be -0.20, 95% CI [-0.42, 0.02].

The impact of CBT on mental health difficulties was significant, with an effect size of -0.54, 95% CI [-0.78, -0.30], $p < 0.001$. The finding was heterogeneous, $Q = 64.26$, $p < 0.001$, $I^2 = 81.33$. The effect size was estimated to be 0.68, CI [-0.97, -0.40], after adjusting for the presence of a publication bias.

CBT as an intervention was found to have a significant effect, $g^* = 0.48$, 95% CI [0.02, 0.24], $p < 0.001$, on caregiver adaptive coping. Moderate heterogeneity was established, $Q = 22.41$, $p < 0.01$, $I^2 = 68.76$. Adjusting for the presence of a publication bias, the effect size was estimated to be 0.44, 95% CI [0.20, 0.68].

CBT interventions were found to have a significant effect on caregiver dysfunctional thoughts, $g^* = -1.33$, 95% CI [-2.22, -0.44], $p < 0.01$. A high degree of heterogeneity was found, $Q = 37.38$, $p < 0.001$, $I^2 = 89.30$. Adjusting for the presence of a publication bias, the effect size was estimated to be -1.64, 95% CI [-2.71, -0.58].
3.4 Impact of caregiver, care and intervention characteristics on CBT outcome

Simple regression based on the random effects model was used to examine the relationship between covariates and study effect sizes, the dependent variable, for each outcome variable. Intervention covariates included length of interventions according to the number of sessions and total time. Caregiver covariates included caregiver gender, relationship to the care recipient, and ethnicity. Covariates were evaluated individually.

3.4.1 Length in sessions.

The length of intervention according to the total number of sessions did not explain a significant proportion of variance in the effect sizes for the impact of CBT on depression and burden, $\beta = 0.11$, $SE = 0.10$, $Z = -1.15$, $p = 0.25$ and $\beta = 0.01$, $SE = 0.02$, $Z = 0.42$, $p = 0.68$, respectively. However, the total number of sessions explained a significantly proportion of the variance in the effect sizes for the impact of CBT on adaptive coping, $\beta = -0.07$, $SE = 0.04$, $Z = -1.97$, $p = 0.05$, see table 3. This indicated that CBT is more effective when interventions have fewer sessions, see figure 2.

![Figure 2. Regressional analysis of intervention session length & adaptive coping](image)

The total number of sessions did not significantly predict the effect of CBT on mental health difficulties and dysfunctional thoughts, $\beta = 0.09$, $SE = 0.06$, $Z = 1.53$, $p = 0.13$ and $\beta = 0.03$, $SE = 0.29$, $Z = 0.10$, $p = 0.92$, respectively.
3.4.2 Length in hours.

A non-significant predictive relationship was found between the duration of the intervention in hours and effect sizes for the impact of CBT on depression, burden, and mental health, $\beta = -0.006, SE = 0.03, Z = -0.16, p = 0.87$ and $\beta = 0.01, SE = 0.01, Z = 1.30, p = 0.19$, respectively.

The variance in effect sizes for the impact of CBT on mental health difficulties was not significantly explained by the intervention length in total number of hours, $\beta = 0.006, SE = 0.03, Z = 0.22, p = 0.83$, see table 3. The total length of the intervention in hours was also not found to significantly predict the effect size of CBT on adaptive coping or dysfunctional thoughts ($\beta = -0.02, SE = 0.18, Z = -0.12, p = 0.90$, respectively)

Table 3.
Summary of simple meta-regression analyses for intervention characteristics

<table>
<thead>
<tr>
<th></th>
<th>Depression</th>
<th>Burden</th>
<th>MH</th>
<th>AC</th>
<th>DT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B  SE</td>
<td>B  SE</td>
<td>B  SE</td>
<td>B  SE</td>
<td>B  SE</td>
</tr>
<tr>
<td>N sessions</td>
<td>0.12 0.10</td>
<td>-0.01 0.03</td>
<td>0.09 0.06</td>
<td>-0.07* 0.04</td>
<td>0.03 0.29</td>
</tr>
<tr>
<td>Length (hours)</td>
<td>-0.006 0.03</td>
<td>0.01 0.01</td>
<td>0.01 0.03</td>
<td>-0.01 0.58</td>
<td>-0.02 0.18</td>
</tr>
<tr>
<td>% female</td>
<td>-0.03 0.02</td>
<td>-0.008 0.01</td>
<td>-0.02 0.02</td>
<td>-0.01 0.01</td>
<td>-0.06 0.04</td>
</tr>
<tr>
<td>% spouse</td>
<td>-0.03 0.02</td>
<td>0.001 0.008</td>
<td>-0.02 0.01</td>
<td>-0.01 0.01</td>
<td>-0.07 0.04</td>
</tr>
<tr>
<td>% adult child</td>
<td>0.09 0.03</td>
<td>-0.02* 0.01</td>
<td>0.01 0.02</td>
<td>0.01 0.01</td>
<td>0.06 0.05</td>
</tr>
<tr>
<td>% Caucasian</td>
<td>0.01 0.005</td>
<td>-0.01 0.01</td>
<td>-0.01 0.01</td>
<td>0.01 0.01</td>
<td></td>
</tr>
</tbody>
</table>

Note. M.H= Mental health; A.C= Adaptive coping; D.T= dysfunctional thoughts; Hrs= hours; $B =$ regression coefficient; SE= standard error; N sessions= length of intervention by number of sessions; Length (hours) = length of interventions in hours; % female= proportion of female caregivers; % spouse = proportion of spousal caregivers; % adult child = proportion of caregivers caring for a parent; % Caucasian= proportion of caregivers from a Caucasian ethnic background; $p < 0.05$, $p < 0.01$, $p < 0.001$. 

170
3.4.3 Caregiver relationship.

3.4.3.1 Spouse.

The mean number of spouse caregiver participants reported by the studies did not significantly predict study effect sizes for the impact of CBT on adaptive coping or burden, $\beta = -0.004, SE = 0.01, Z = -0.29, p = 0.77$ and $\beta = 0.01, SE = 0.008, Z = 1.26, p = 0.21$, respectively, see table 8. The variance in effect sizes for the impact of CBT on dysfunctional thoughts was not significantly explained by percentage of spousal caregivers, $\beta = -0.07, SE = 0.04, Z = -1.60, p = 0.11$. The percentage of spouse caregiver participants reported by the studies did not significantly predict the effect sizes for the impact of CBT on mental health difficulties or depression, $\beta = -0.02, SE = 0.01, Z = -1.47, p = 0.14$ and $\beta = -0.03, SE = 0.02, Z = -1.55, p = 0.11$.

3.4.3.2 Adult child.

The percentage of adult child caregiver participants reported by the studies significantly predicted study effect sizes for the impact of CBT on burden, $\beta = -0.01, SE = 0.009, Z = -1.98, p = 0.05$. This indicated that CBT is more effective when fewer adult child caregivers engaged in the intervention, see figure 3.

![Figure 3. Correlation between caregiver burden & the proportion of adult child caregivers participating in intervention studies](image-url)
A non-significant predictive relationship was found between the percentage of female caregivers reported by the studies and effect sizes for the impact of CBT on depression or mental health, $\beta = 0.009$, $SE = 0.03$, $Z = 0.28$, $p = 0.78$, and $\beta = 0.006$, $SE = 0.03$, $Z = 0.24$, $p = 0.81$, respectively. The variance in effect sizes for the impact of CBT on dysfunctional thoughts or adaptive coping were not significantly explained by percentage of adult child caregivers, $\beta = 0.06$, $SE = 0.05$, $Z = 1.18$, $p = 0.24$ and $\beta = 0.001$, $SE = 0.01$, $Z = -0.10$, $p = 0.92$.

3.2.4 Caregiver gender.

A non-significant predictive relationship was found between the percentage of female caregivers reported by the studies and effect sizes for the impact of CBT on depression, and burden, $\beta = -0.03$, $SE = 0.02$, $Z = -1.52$, $p = 0.13$, $\beta = -0.007$, $SE = 0.008$, $Z = -0.97$, $p = 0.33$, respectively. The variance in effect sizes for the impact of CBT on mental health difficulties was not significantly explained by percentage of female caregivers, $\beta = -0.02$, $SE = 0.02$, $Z = -1.30$, $p = 0.19$, respectively. The percentage of female caregivers was also not found to significantly predict the effect size of CBT on adaptive coping or dysfunctional thoughts ($\beta = -0.005$, $SE = 0.01$, $Z = -0.45$, $p = 0.65$ and $\beta = -0.06$, $SE = 0.04$, $Z = -1.48$, $p = 0.14$, respectively).

3.4.5 Ethnic Background.

The percentage of caregivers reported by studies as Caucasian was not found to significantly predict the effect of CBT on burden, mental health difficulties or adaptive coping, $\beta = 0.005$, $SE = 0.004$, $Z = 1.16$, $p = 0.25$, $\beta = -0.007$, s.e. = 0.005, $Z = -1.37$, $p = 0.17$ and $\beta = -0.04$, $SE = 0.004$, $Z = -0.95$, $p = 0.34$, respectively, see table 3. As small numbers of studies reported the ethnic background of caregivers, differences could not subsequently be evaluated for depression and dysfunctional thoughts, see table 3.
3.5 Subgroups analyses of the effect of CBT according to intervention and caregiver characteristics

A Q-test was undertaken based on variance analysis to compare the mean effect size, hedge’s $g^*$, for different subgroups of studies classified according to the demographics of the caregivers and characteristics of care context and cognitive behavioural intervention.

3.5.1 Intervention characteristics.

The difference in caregiver depression between intervention studies using minimal support, standard support and waiting list control conditions is statistically significant ($Q_{bet}^* = 7.33$, $df = 2$, $p = 0.03$), see table 4. A statistically significant effect size for the impact of CBT on depression was found for studies comparing this intervention with a waiting list condition, $g^* = -1.24$, 95% CI [-1.84, -0.63], $p < 0.001$. However, non-significant effect sizes of -0.23 and -0.23 were found when CBT was compare with to minimal support or standard care, respectively.

No significant differences were found in the effect sizes for the impact of CBT on caregiver burden, adaptive coping or dysfunctional thoughts according to the type of control condition ($Q_{bet}^* = 2.98$, $df = 3$, $p = 0.90$, $Q_{bet}^* = 2.42$, $df = 2$, $p = 0.30$, and $Q_{bet}^* = 0.25$, $df = 2$, $p = 0.88$, respectively).

A statistically significant difference was found in caregiver mental health between intervention studies using minimal support, standard support and waiting list conditions ($Q_{bet}^* = 10.81$, $df = 2$, $p = 0.004$). CBT had a significantly greater effect than waiting list and minimal support conditions on caregiver mental health, $g^* = -1.06$, 95% CI [-1.44, -0.67], $p < 0.001$ and $g^* = -0.29$, 95% CI [-0.58, 0.01], $p = 0.05$, respectively. The impact of CBT on mental health difficulties was not statistically significant when studies compared the CBT to standard care, with an effect size of -0.32.
3.5.2 Delivery Method.

The difference in caregiver adaptive coping between intervention studies using individual, group and mixed or combined methods of delivery is statistically significant ($Q_{bet}^* = 11.40, df = 2, p = 0.003$), see table 4. A statistically significant effect size for the impact of CBT on adaptive coping was found for studies using a group, individual and mixed delivery methods, $g^* = 0.47$, 95% CI [0.23, 0.72], $p < 0.001$ and $g^* = 1.11$, 95% CI [0.61, 1.61], $p < 0.001$ and $g^* = 0.22$, 95% CI [0.03, 0.41], $p < 0.001$, respectively.

Non-significant differences were found in the mean effect sizes on caregiver depression, burden, mental health difficulties and dysfunctional thoughts between studies according to the type of control condition ($Q_{bet}^* = 1.07, df = 2, p = 0.58$; $Q_{bet}^* = 0.59, df = 2, p = 0.23$; $Q_{bet}^* = 2.40, df = 4, p = 0.663$; $Q_{bet}^* = 0.004, df = 1, p = 0.95$, respectively).
Table 4: Subgroup analysis of impact of control type on caregiver outcomes

<table>
<thead>
<tr>
<th>Control type</th>
<th>Depression</th>
<th>Burden</th>
<th>Mental health</th>
<th>Adaptive Coping</th>
<th>Dysfunctional Thoughts</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$g^*$</td>
<td>95% CI</td>
<td>$g^*$</td>
<td>95% CI</td>
<td>$g^*$</td>
</tr>
<tr>
<td>MS</td>
<td>-0.23, -0.72, -0.43**, -0.62, -0.07</td>
<td>-0.29**, -0.58, 0.01</td>
<td>0.27, 0.05, -1.26, -4.52, 1.99</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SC</td>
<td>-0.23, -0.98, -0.15*, -0.56, 0.27</td>
<td>-0.32, -0.72, 0.09</td>
<td>0.63***, 0.29, 0.96, -0.75, -3.77, 2.26</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WL</td>
<td>-1.24***, -1.84, -0.66**, -1.08, -0.24</td>
<td>-1.06***, -1.44, -0.67</td>
<td>0.60*, 0.01, -1.63, -3.41, 0.15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q*bet</td>
<td>7.33**</td>
<td>2.98</td>
<td>10.81**</td>
<td>2.42</td>
<td>0.25</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Delivery Method</th>
<th>Depression</th>
<th>Burden</th>
<th>Mental health</th>
<th>Adaptive Coping</th>
<th>Dysfunctional Thoughts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NA</td>
<td>-0.32, -1.04, -0.52, -1.46, 0.43</td>
<td>-1.11***, 0.61, 1.61</td>
<td>NA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group</td>
<td>-0.76**, -1.32, -0.37*, -0.73, 0.01</td>
<td>-0.67***, -1.04, -0.30</td>
<td>0.47***, 0.23, -1.35**, -2.37, 0.72</td>
<td>-0.33</td>
<td></td>
</tr>
<tr>
<td>TBI</td>
<td>-0.15, -1.53, -0.67, -1.42, 0.08</td>
<td>-1.05*, -2.04, -0.05</td>
<td>NA</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Mixed</td>
<td>-0.37, -1.08, -0.39*, -0.78, 0.01</td>
<td>-0.30, -0.82, 0.22</td>
<td>0.22*, 0.03, -1.27**, -2.27, 0.41</td>
<td>-0.41</td>
<td></td>
</tr>
<tr>
<td>Q*bet</td>
<td>1.07</td>
<td>0.59</td>
<td>2.40</td>
<td>11.40**, 0.01</td>
<td></td>
</tr>
</tbody>
</table>

Note. M.H = Mental health; A.C = Adaptive coping; D.T = dysfunctional thoughts; MS = minimal support; SC = standard care; WL = waiting list; TBI = technology-based intervention; $g^*$ = adjusted, weighted effect size, hedge’s $g$; 95% CI = 95% confidence interval; $Q^*$bet = weighted sum of squared deviations of the subgroup means about the grand mean; NA = not applicable, insufficient or no outcomes reported.

*p < 0.05, **p < 0.01, ***p < 0.001.
<table>
<thead>
<tr>
<th>Intervention Specificity</th>
<th>Depression</th>
<th>Burden</th>
<th>Mental Health</th>
<th>Adaptive Coping</th>
<th>Dysfunctional thoughts</th>
</tr>
</thead>
<tbody>
<tr>
<td>AD only</td>
<td>-0.25</td>
<td>-0.22</td>
<td>-0.39*</td>
<td>0.41**</td>
<td>-0.39*</td>
</tr>
<tr>
<td></td>
<td>0.27</td>
<td>0.03</td>
<td>-0.66, 0.12</td>
<td>0.15, 0.68</td>
<td>-0.95, 2.34</td>
</tr>
<tr>
<td>Mixed</td>
<td>-1.44***</td>
<td>-0.91**</td>
<td>-1.17***</td>
<td>0.77**</td>
<td>-1.90*, -3.82, 0.02</td>
</tr>
<tr>
<td></td>
<td>-2.15</td>
<td>-1.51</td>
<td>-1.71, -0.62</td>
<td>0.214, 1.31</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-0.73</td>
<td>-0.30</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q*bet</td>
<td>4.75*</td>
<td>5.66*</td>
<td>6.32*</td>
<td>1.27</td>
<td>0.75</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Care duration (months)</th>
<th>Depression</th>
<th>Burden</th>
<th>Mental Health</th>
<th>Adaptive Coping</th>
<th>Dysfunctional thoughts</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 – 36</td>
<td>-0.40</td>
<td>-0.51*</td>
<td>-1.08, 0.14</td>
<td>0.81***</td>
<td>-0.95, 0.81**</td>
</tr>
<tr>
<td></td>
<td>0.69</td>
<td>-0.05</td>
<td></td>
<td>0.49, -0.08</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>37 – 43</td>
<td>-1.99***</td>
<td>-3.05*</td>
<td>-1.40***</td>
<td>1.27</td>
<td>-3.75***</td>
</tr>
<tr>
<td></td>
<td>-2.74,</td>
<td>-5.52</td>
<td>-1.93, -0.86</td>
<td>-1.12, 3.66</td>
<td>-4.83, -2.67</td>
</tr>
<tr>
<td></td>
<td>-1.25</td>
<td>-0.57</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>44 – 49</td>
<td>-0.40</td>
<td>-0.33</td>
<td>-0.56*</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td>-1.10,</td>
<td>-0.75</td>
<td>-1.09, -0.03</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.30</td>
<td>0.09</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50 – 56</td>
<td>-0.40</td>
<td>-0.40</td>
<td>-0.40, 0.14</td>
<td>0.57**</td>
<td>-0.57**</td>
</tr>
<tr>
<td></td>
<td>-1.04,</td>
<td>-0.98</td>
<td>-0.95, 0.14</td>
<td>0.18, -0.97,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.23</td>
<td>0.19</td>
<td></td>
<td>0.96, -0.17</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>57 - 63</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>64 - 69</td>
<td>NA</td>
<td>-1.50*</td>
<td>NA</td>
<td>1.64*</td>
<td>-1.27, -2.61, 0.08</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-2.87</td>
<td></td>
<td>0.29, 2.98</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>-0.14</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q*bet</td>
<td>18.00***</td>
<td>8.59</td>
<td>13.55**</td>
<td>16.37**</td>
<td>29.40***</td>
</tr>
</tbody>
</table>

Note. M.H= Mental health; A.C= Adaptive coping; D.T= dysfunctional thoughts; MS= minimal support; SC= standard care; WL= waiting list; TBI= technology-based intervention; g*= adjusted, weighted effect size, hedge's g; 95% CI= 95% confidence interval; Q*bet = weighted sum of squared deviations of the subgroup means about the grand mean; NA= not applicable, insufficient or no outcomes reported.

* p < 0.05, ** p < 0.01, *** p < 0.001.
3.5.3 Type of dementia.

The difference in caregiver depression between intervention studies for Alzheimer caregivers and caregivers of mixed dementia diagnoses is statistically significant ($Q_{bet}^* = 4.75$, $df = 2$, $p < 0.001$), see table 4. A statistically significant effect size for the impact of CBT on depression was found for studies including caregivers of all types of dementia, $g^* = -1.44$, 95% CI [-2.15, -0.73], $p = 0.001$. A non-significant effect size for the impact of CBT was determined for Alzheimer caregivers of -0.25.

A statistically significant difference was found in caregiver burden between intervention studies for Alzheimer caregivers and caregivers for an individual with a range of dementia types ($Q_{bet}^* = 5.66$, $df = 2$, $p = 0.05$). The effect of CBT on burden was statistically significant for studies recruiting caregivers of mixed dementia types, $g^* = -0.91$, 95% CI [-1.51, -0.30], $p = 0.003$. However, a non-significant effect size of -0.22 was found for Alzheimer caregivers.

The difference in caregiver mental health difficulties between intervention studies for Alzheimer caregivers and caregivers of mixed dementia diagnoses is statistically significant ($Q_{bet}^* = 6.32$, $df = 2$, $p = 0.04$). Statistically significant effect sizes for the impact of CBT on mental health difficulties was found for studies including caregivers of Alzheimer’s disease and all types of dementia, $g^* = -0.39$, 95% CI [-0.66, -0.12], $p = 0.004$, and $g^* = -1.17$, 95% CI [-1.71, -0.62], $p < 0.001$, respectively.

No statistically significant differences in the mean effect sizes on caregiver adaptive coping and dysfunctional thoughts was found between studies for Alzheimer caregivers and caregivers of all dementia types ($Q_{bet}^* = 1.27$, $df = 1$, $p = 0.26$, and $Q_{bet}^* = 0.75$, $df = 2$, $p = 0.69$, respectively).
3.5.4 Care duration.

The difference in caregiver depression between intervention studies with a mean care duration of 30 to 36, 37 to 43, 44 to 49, and 50 to 56 months is statistically significant ($Q_{bet}^* = 18.00, df = 4, p = 0.001$), see table 4. A statistically significant effect size for the impact of CBT on depression was found for the mean care duration of 37 to 43 months, $g^* = -1.99, 95\% \text{ CI} [-2.74, -1.25], p = p < 0.001$. The impact of CBT on depression was not statistically significant for studies reporting the mean duration of caregiving between 30 to 36, 44 to 49 and 50 to 56 months, with effect sizes of -0.40 for all of these categories.

No statistically significant difference in the mean effect sizes on caregiver burden was found according to the mean care duration ($Q_{bet}^* = 8.59, df = 5, p = 0.13$).

Differences in the effect of CBT on mental health difficulties were significant according to the mean care duration ($Q_{bet}^* = 13.55, df = 4, p = 0.009$). The impact of CBT on mental health difficulties was significantly significant for studies reporting a mean care duration of 37 to 43 and 44 to 49 months, $g^* = -1.40, 95\% \text{ CI} [-1.93, -0.86], p < 0.001$ and $g^* = -0.56, 95\% \text{ CI} [-1.09, -0.03], p = 0.03$, respectively. No significant difference was found for the care durations between 30 to 36 and 50 to 56 months, with effect sizes of -0.47 and -0.40, respectively.

The difference in caregiver adaptive coping was statistically significant according to length of caregiving ($Q_{bet}^* = 16.37, df = 4, p = 0.003$). Specifically, the impact of CBT on adaptive coping was determined for studies with a mean care duration of 30 to 36, 50 to 56, and 64 to 69 months of 0.81, 95\% CI [0.49, 1.14], $p < 0.001$, $g^* = 0.57, 95\% \text{ CI} [0.18, 0.96], p = 0.004$ and $g^* = 1.64, 95\% \text{ CI} [0.29, 2.98]$,
The impact of CBT on adaptive coping was not significant for care duration of 37 to 43 month, with an effect size of 1.27.

Differences in the effect of CBT on dysfunctional thoughts were significant according to the mean care duration ($Q_{bet}^* = 29.40$, $df = 3$, $p < 0.001$). The impact of CBT on dysfunctional thoughts was statistically significant for mean care durations of 37 to 43 and 50 to 56 months, $g^* = -3.75$, 95% CI [-4.83, -2.67], $p < 0.001$ and $g^* = -0.57$, 95% CI [-0.97, -0.17], $p < 0.001$, respectively. Non-significant effect sizes on dysfunctional thoughts were found of -0.95 and -1.27 for studies reporting the mean care duration between 30 to 36, and 64 to 69 months, respectively.
4.0 Discussion

4.1 CBT as a means of alleviating distress and maladaptive coping

CBT applied with informal dementia caregivers was efficacious in improving caregiver depression, burden, mental health, adaptive coping and dysfunctional thoughts about caregiving (see table 2).

The findings established by Pinquart and Sörensen (2006) reflect those established in this review. Effects of -0.36 and -0.70 were reported for burden and depression, respectively (Pinquart & Sörensen, 2006). This compares to effects of -0.37 and 0.55 for burden and depression, established in this review (see table 3). The findings are significant for burden as relatively insensitive to change, with other interventions failing to establish similar outcomes (Chien et al., 2011; Pinquart & Sörensen, 2006). Insensitivity to change has been attributed to the term burden encapsulating two related but distinct concepts, objective and subjective burden (Braithwaite, 1992). These have not tended to be differentially evaluated within standard measures of caregiver burden (Bédard et al., 2001; Gupta, 1999).

Emotional regulation techniques in CBT may influence change in subjective burden, with modification of dysfunctional thoughts indirectly effecting objective burden. Dysfunctional thoughts about caregiving can result in caregivers placing excessive restrictions on their lives through misperceptions of the care recipient’s ability or in striving for role perfectionism (Losada et al., 2008). However, the predictive value of adaptive coping and dysfunctional thoughts on caregiver distress could not be evaluated as a result of small study numbers. Further research is required to explicitly evaluate the mechanisms of change.
4.2 Impact of the care context and caregiver characteristics

Caregiver characteristics, such as gender and ethnic background, had little impact on the outcomes of CBT (see table 3). Whilst the meta-analyses by Chien et al. (2011) and Pinquart and S örensen (2006) evaluated a range of interventions, larger samples of female participants were associated with greater reductions in depression (Chien et al., 2011; Pinquart & S örensen, 2006). Ethnicity was not considered in these reviews. However, in the general population culturally sensitive CBT has had greater gains than standard CBT (Hwang, Wood, Lin & Cheung, 2006; Interian & Diaz-Martinez, 2007; Miranda, Azocar, Organista, Dwyer, & Areane, 2003). The lack of significant difference according to ethnicity and gender in this review may be attributed to the method of analysis, which was reliant on different proportions of caregiver subgroups. However, the interventions in these studies were culturally tailored (Au et al., 2010; Belle et al., 2006; Burgio et al., 2003).

Tailoring interventions according to dementia type was also recommended to facilitate greater improvement for caregivers (S örensen & Conwell, 2011). However, significantly smaller effects on depression, burden and mental health were found in this review for dementia specific CBT compared to generic interventions (see table 4). Tailoring CBT by dementia type may be more significant for interventions focused on developing more adaptive care skills rather than alleviating emotional distress as the latter uses techniques applicable to a range of stressors.

Consistent with the findings of Chien et al. (2011), the impact of CBT was not found to be significantly related to the nature of relationship between caregiver and care recipient (see table 4). However, the effect of CBT on burden was greater with interventions that had more adult child caregiver participants (see table 4). Further exploration of differences by caregiver type may be warranted given recent evidence
that the emotional experiences of older and working adults differ (Carstensen et al., 2011).

4.3 Impact of intervention characteristics

Overall, the intervention duration and delivery had little impact on the effects of CBT outcomes, see table 4. This may be expected given intervention duration was generally consistent with the recommendations for standard brief psychotherapy (Laidlaw et al., 2003). However, interventions with larger numbers of sessions were negatively associated with adaptive coping. Interventions delivered over a longer period may not meet the fluctuating needs of caregivers. Differences in the effects of CBT on adaptive coping were also associated with the method of delivery, with individual interventions having larger effects than group or mixed delivery methods (see table 4). Greater specificity to the needs of the caregiver may be achieved in individually delivered interventions.

The type of control condition used by the study did not influence the effects of CBT on mental health difficulties, adaptive coping or dysfunctional thoughts. However, the effects of CBT on depression were only significant when CBT was compared to a non-active control condition. This suggests that CBT was not significantly more effective than minimally active interventions. Whilst the impact of CBT on burden was greatest when non-active conditions were used, a significant effect was found for minimally active interventions.

Evidence was established to suggest CBT delivery is time sensitive, with larger effects on depression, mental health and dysfunctional thoughts found for studies with a larger number of participants having provided care for 37 to 43 months. For adaptive coping, larger effect sizes were found between 64 to 69 months (see table 4). Given that the interventions included in the review focused on alleviating
Caregiver Interventions
caregiver distress and facilitating care skills, CBT may be maximally useful when applied in later stages of caregiving as caregivers are in need of coping strategies that CBT can equip people with. The caregiver role may involve a series of transitions with different focuses and tasks, such as acceptance and role accommodation, provision of care and coping emotional with the strain of caregiving, and role termination and bereavement (Piipainen & Whitlatch, 2011). Caregiver interventions may be more effective when tailored to the tasks and stressors of each transitional stage of the role. It may be possible to design CBT to match the needs of caregivers and the tasks of caregiving across the disease progression.

4.4 Methodological weaknesses of CBT studies

Research studies have tended to evaluate specific caregiver subpopulations, with caregivers experiencing the greatest distress least likely to be considered (Knight et al., 1993; Robinson et al., 2005). A broad range of recruitment methods were used by Au et al. (2010), Burgio et al. (2003) and Losada et al. (2011) to increase the representativeness of the sample. However, these methods were focused on the recruitment of ethnic minority subpopulations. The effects of CBT cannot, therefore, be considered as applicable to the population of caregivers as a whole.

Differences were apparent in the intervention aims. However, participation in these interventions has not been matched according to the difficulties experienced by caregivers. For instance, Au et al. (2010), Gallagher-Thompson et al. (2008) and Coon et al. (2003) did not restrict inclusion to caregivers with clinical significant levels of anxiety or depression. Furthermore, the impact care skills focused CBT on care practices has not consistently been explored despite indications in the literature that misconceptions of the functional ability of the care recipient is associated with inappropriate involvement in care (Harvath, 1994; Izal et al., 2005; Mittelman et al.,
2003). Overall, greater consideration of intervention characteristics, such as specificity the needs of caregivers and the timing of delivery is needed.

4.5 Methodological weaknesses of this review

A small number of relevant studies were identified using the search criteria, with publication biases identified for all outcomes. The number of included studies may have been restricted by an insufficient focus given to identifying unpublished literature and difficulties classifying interventions. Intervention studies tended to provide limited information of the theoretical grounding and nature of the interventions. When possible clarity was sought, however it is possible that intervention may have been inappropriately excluded. The lack of multiple, independent reviews may have compounded this difficulty. The search process introduced a tower of babel bias as only studies written in English were considered (Grégoire, Derderian, F., & Le Lorier, 1995).

The validity and reliability of the quality assurance measure was unknown as the tool was adapted to be specific to methodological weaknesses previously highlighted in earlier meta-analyses (Knight et al., 1993; Pinquart & Sorensen, 2006). However, the method of assessment was based on the recommendations of Higgins and Green (2011). Furthermore, data analyses may not have sufficiently resolved difficulties with outcome dependency. Rosenthal and Rubin’s (1986) equation, the recommended method, could not be used as the inter-correlation between responses was not reported by intervention studies (DeCoster, 2009). Although various methods of combining the outcomes were explored to determine the most modest effect, the findings may over- or under-represent the estimated population effect size. However, outcome dependency has not been explored in prior meta-analytic reviews of caregiver interventions.
The focus of this review was the impact of CBT compared to minimally active interventions. These interventions traditionally represented standard practice within the services offering support to caregivers. However, it would have been beneficial to contrast the impact of CBT compared to minimal active conditions and other interventions, such as psychosocial interventions or psychotherapy. This would limit the possibility of over-estimating the effect.

4.6 Clinical Implications

CBT has substantial potential as an intervention for improving caregiver mental health and burden. This is a particularly significant goal for specialist dementia services given the high prevalence of mental health difficulties in this population (Pinquart & Sörensen, 2003). The effects of CBT extend beyond mere symptom reduction as this intervention is efficacious in facilitating more adaptive appraisals of caregiving and coping. Furthermore, CBT may be well placed as an intervention for caregivers who would not typically engage with support as it is the only intervention, to date, that adequately addresses the cognitive barriers restricting access to support services (Brodaty et al., 2005; Losada et al., 2006; Losada et al., 2010; Montorio et al., 2009).

The exploration of interventions for caregivers has focused on determining the impact of a single intervention. However, delivery of a single intervention, at a single time point is unlikely to produce long term amelioration of caregiver distress and does not reflect the complexity and fluidity of the role (Knight et al., 1993). A stepped and integrated approach to service provision for caregivers may be more appropriate, with interventions tailored to the needs of the caregivers at particularly sensitive transitional periods within the role.
4.7 Summary

CBT has been found to be efficacious in alleviating caregiver emotional distress, specifically depression, burden and mental health difficulties, and increasing adaptive cognitive and coping responses to caregiving. The effects of CBT may be influenced by the characteristics of the caregiver and the method of delivery. However, research is needed to consider the application of the broad range of caregiver interventions across the disease progression and the role of CBT within this context.
5.0 References


the quality of life of dementia caregivers form different ethnic or racial groups.

*Annals of Internal Medicine*, 147, 727-738.


THESIS REFERENCES

Including references for the systematic review,

meta-analysis,

and thesis journal article.
THESIS REFERENCES


Caregiver Interventions


coping skills to reduce health risk and improve psychological and physical well-being in Alzheimer’s disease family caregivers. *Psychosomatic Medicine*, 72, 897-904.


APPENDICES

Appendix I:
Criteria for the assessment of methodological quality of empirical reviews

Appendix II:
Summary of Reviews excluded based on methodological Quality

Appendix III:
‘Psychology and Aging’ publication guidelines applied to the systematic review

Appendix IV:
‘The Gerontologist’ publication guidelines applied to the thesis journal article
APPENDIX I

Criteria for the assessment of methodological quality of empirical reviews

The following criteria have been developed based on the Scottish Intercollegiate Guideline Network’s (SIGN) methodological checklist, Cochrane’s criteria for risk of bias, and the assessment of multiple systematic reviews (Higgins & Green, 2011; Shea et al., 2007; Scottish Intercollegiate Guideline Network [SIGN], 2008). Consideration was given within these criteria to the criticisms raised by Knight et al. (19993).

Date: Reviewed by:
Title:
Main author: Year:
No of authors/reviewers:
Journal:
Peer reviewed:

Period covered by review:
Review question:

<table>
<thead>
<tr>
<th>1. INTERNAL VALIDITY</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protocol or design established before the review was conducted?</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Appropriate &amp; clearly focused question</td>
<td>Well covered</td>
<td>Not addressed</td>
</tr>
<tr>
<td>Adequately addressed</td>
<td>Not reported</td>
<td></td>
</tr>
<tr>
<td>Poorly addressed</td>
<td>Not applicable</td>
<td></td>
</tr>
<tr>
<td>Description of methodology</td>
<td>Well covered</td>
<td>Not addressed</td>
</tr>
<tr>
<td>Is methodology systematic? Is there a detailed description of methods for identifying &amp; evaluating articles?</td>
<td>Adequately addressed</td>
<td>Not reported</td>
</tr>
<tr>
<td>Does it include information on the databases &amp; other sources used, selection criteria (population, intervention, outcome &amp; study design), and the method of extracting info &amp; combining results</td>
<td>Poorly addressed</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Literature Search</td>
<td>Well covered</td>
<td>Not addressed</td>
</tr>
<tr>
<td>Is the literature search sufficiently comprehensive to identify all relevant studies?</td>
<td>Adequately addressed</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Is the search limited? minimum standards include Embase, Medline &amp; Cochrane Lib. Does the search include hand searching of key journals or contact made to authors, attempts to include grey literature? (manual search, personal communication)</td>
<td>Poorly addressed</td>
<td>Not reported</td>
</tr>
<tr>
<td>Topic</td>
<td>Rating</td>
<td>Details</td>
</tr>
<tr>
<td>------------------------------------------------</td>
<td>----------------------</td>
<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>No of databases searched</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Replicability</strong></td>
<td><strong>yes</strong></td>
<td><strong>no</strong></td>
</tr>
<tr>
<td><strong>Grey Literature</strong></td>
<td><strong>yes</strong></td>
<td><strong>no</strong></td>
</tr>
<tr>
<td><strong>Search Reliability</strong></td>
<td><strong>yes</strong></td>
<td><strong>no</strong></td>
</tr>
<tr>
<td><strong>Assessment of study quality</strong></td>
<td><strong>Well covered</strong></td>
<td><strong>Not addressed</strong></td>
</tr>
<tr>
<td>Are clear, explicit, standardised criteria used?</td>
<td><strong>Adequately addressed</strong></td>
<td><strong>Not reported</strong></td>
</tr>
<tr>
<td>Are the criteria follow recommendations of SIGN, Cochrane or similar? Are details included of the study quality review outcome? Are raters blind to the study author and journal details?</td>
<td><strong>Poorly addressed</strong></td>
<td><strong>Not applicable</strong></td>
</tr>
<tr>
<td>Is the methodological review undertaken by at least 2 people?</td>
<td><strong>yes</strong></td>
<td><strong>no</strong></td>
</tr>
<tr>
<td><strong>Similarity between selected studies</strong></td>
<td><strong>Well covered</strong></td>
<td><strong>Not addressed</strong></td>
</tr>
<tr>
<td>Clear inclusion criteria? Are studies similar enough to be comparable? Similar populations? Methodology? Outcomes measures? Variability in effect sizes between studies not greater than chance?</td>
<td><strong>Adequately addressed</strong></td>
<td><strong>Not reported</strong></td>
</tr>
<tr>
<td><strong>Language of the articles</strong></td>
<td><strong>Well covered</strong></td>
<td><strong>Not addressed</strong></td>
</tr>
<tr>
<td>Only English?</td>
<td><strong>Adequately addressed</strong></td>
<td><strong>Not reported</strong></td>
</tr>
<tr>
<td><strong>Adequate description of articles</strong></td>
<td><strong>Poorly addressed</strong></td>
<td><strong>Not applicable</strong></td>
</tr>
<tr>
<td>Very brief, covers a lot- 2Srs effectively. Might have been better to separate- very brief description of intervention studies</td>
<td><strong>Data extraction completed by at least 2 people?</strong></td>
<td><strong>yes</strong></td>
</tr>
<tr>
<td><strong>Explicit method of combining research findings - qualitative &amp; quantitative separate methods?</strong></td>
<td><strong>Were the methods used to combine the findings of studies appropriate?</strong></td>
<td><strong>Well covered</strong></td>
</tr>
<tr>
<td>For the pooled results, a test should be done to ensure the studies were comparable, to assess their homogeneity (e.g. Chisquared test for homogeneity, I2). If heterogeneity exists a random effects model should be used and/or the clinical appropriateness of combining should be taken into consideration (i.e. is it sensible to combine?).</td>
<td><strong>Adequately addressed</strong></td>
<td><strong>Not reported</strong></td>
</tr>
<tr>
<td><strong>Poorly addressed</strong></td>
<td><strong>Not applicable</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Conclusions supported by the data?</strong></td>
<td><strong>Well covered</strong></td>
<td><strong>Not addressed</strong></td>
</tr>
<tr>
<td><strong>Was the likelihood of publication bias assessed?</strong></td>
<td><strong>Adequately addressed</strong></td>
<td><strong>Not reported</strong></td>
</tr>
<tr>
<td>An assessment of publication bias should include a combination of graphical aids (e.g., funnel plot, other available tests) and/or statistical tests (e.g., Egger regression test).</td>
<td><strong>Poorly addressed</strong></td>
<td><strong>Not applicable</strong></td>
</tr>
</tbody>
</table>
### OVERALL ASSESSMENT OF THE STUDY

<table>
<thead>
<tr>
<th>Minimisation of bias</th>
<th>Likely direction of bias</th>
</tr>
</thead>
<tbody>
<tr>
<td>Note. ++ = very minimal risk of bias, + = minimal risk, - = risk of bias</td>
<td></td>
</tr>
</tbody>
</table>

### DESCRIPTION OF INCLUDED JOURNAL ARTICLES

<table>
<thead>
<tr>
<th>Types of articles</th>
<th>Does review address your key question?</th>
<th>Overall Strengths &amp; weakness</th>
</tr>
</thead>
</table>
APPENDIX II:

Summary of Reviews excluded based on methodological Quality

The following reviews were excluded as the methodological quality was considered to be poor. The reasons for exclusion and review characteristics are outlined in the table below.

Table A2: Summary of excluded reviews

<table>
<thead>
<tr>
<th>Review</th>
<th>Type of review</th>
<th>Period covered</th>
<th>N studies</th>
<th>Type of studies</th>
<th>Types of interventions</th>
<th>Primary cg outcomes</th>
<th>Reason for exclusion</th>
</tr>
</thead>
</table>

Note.  
SR = systematic review; MA = meta-analysis.
Appendix III:

The publication recommendations of ‘Psychology and Aging’ utilised as a style guide for writing the systematic review

The ‘Psychology and Aging’ forms one of the journals published by The American Psychology Association (APA).

As such, the APA’s (2010) Concise Rules of APA Style was consulted for more specific and detail style guidelines regarding:

- Manuscript Preparation
- Submitting Supplemental Materials
- Abstract and Keywords
- References
- Figures
- Permissions
- Publication Policies
- Ethical Principles

Submission
Submit manuscripts electronically through the Manuscript Submission Portal (.rtf, .doc, or .pdf files).

Ulrich Mayr
Department of Psychology
University of Oregon
Eugene, OR

General correspondence may be directed to the Editor’s Office.

In addition to addresses and phone numbers, please supply email addresses and fax numbers, if available, for potential use by the editorial office and later by the production office.

Keep a copy of the manuscript to guard against loss.

Masked Review Policy

Masked reviews are optional, and authors who wish masked reviews must specifically request them at submission. Authors requesting masked review should make every effort to see that the manuscript itself contains no clues to their identities. Authors’ names, affiliations, and contact information should be included only in the cover letter.

Length

Manuscripts should not exceed 8,000 words (approximately 27 double-spaced pages in 12-point Times New Roman font). Shorter manuscripts are equally welcomed.

The word count does not include references, tables, and figures. If you feel that you need extra space, please contact the editor. For example, you may have a complex methodology or statistical approach or a new theoretical framework that requires more text.

Please include the word count for the main text below the keywords.
Appendix IV:

The publication recommendations of ‘The Gerontologist’ utilised as a style guide for writing the thesis journal article

The Gerontologist is a bimonthly journal of The Gerontological Society of America that provides a multidisciplinary perspective on human aging through the publication of research and analysis in gerontology, including social policy, program development, and service delivery. It reflects and informs the broad community of disciplines and professions involved in understanding the aging process and providing service to older people. Articles, including those in applied research, should report concepts and research findings, with implications for policy or practice. Contributions from social and psychological sciences, biomedical and health sciences, political science and public policy, economics, education, law, and the arts and humanities are welcome. Brief descriptions of innovative practices and programs are appropriate in the Practice Concepts and Policy Analysis section.

1. Submission and Acceptance of Manuscripts

Authors are strongly encouraged to submit all manuscripts online at http://mc.manuscriptcentral.com/tg.

Prior to submission, corresponding authors should gather the following information: (a) complete contact information for themselves and each contributing author; this should include degree, mailing address, and e-mail address; (b) a copy of the manuscript, in a Word-compatible format, including title page, key words, acknowledgments (optional), abstract, text, and references; (c) a cover letter (optional) explaining how the manuscript is innovative, provocative, timely, and of interest to a broad audience, and other information authors wish to share with editors. Note: The cover letter for manuscripts will NOT be shared with reviewers.

This journal requires authors to submit TWO versions of the article file, anonymous and non-anonymous (see below for additional information). Please upload only two files, the anonymous and non-anonymous manuscript files. Please include your tables and figures in these documents, following APA guidelines. Please do not submit PDF versions of your manuscript submission materials. A peer-review title page will be created by the system and will be combined with the anonymous file into a single PDF document for the peer review process by our system.

Instructions for Anonymous Files
Upload one anonymous version of your manuscript with no author names, addresses, acknowledgment details, or other identifiers. Be sure to check there are no self references in the text itself. You can insert the term "blinded for review" in its place. This includes self-references to your name and University/Institute. This version will be seen by reviewers.

Instructions for Non-Anonymous Files
Upload a complete version of the manuscript with all of the author and acknowledgment details. This version will be seen by the editors and will be the version published, IF accepted.

Additional instructions regarding submissions can be obtained by contacting the Managing Editor, Megan McCutcheon, at tg@geron.org.

2. Acceptance of Manuscripts

Submission of a manuscript to The Gerontologist implies that it has not been published or is not under consideration elsewhere. If accepted for this journal, it is not to be published elsewhere without permission. As a further condition of publication, the corresponding author will be responsible, where appropriate, for certifying that permission has been received to use copyrighted instruments or software employed in the research and that human or animal subjects approval has been obtained.
In the case of coauthored manuscripts, the corresponding author will also be responsible for signing a license to publish form on behalf of his or her co-authors indicating that the manuscript is original work, has not been previously published, will not be submitted for publication to any other journal following acceptance in The Gerontologist, and all necessary permissions have been received.

3. Manuscript Preparation

The Gerontologist uses APA style. General guidelines follow; for more detailed information, consult the Publication Manual of the American Psychological Association (6th ed.) Please see section 4 below for additional information about the types of submissions and word counts.

a. Preparing the manuscript. Manuscripts should be double-spaced, including references and tables, on 8-1/2” x 11” paper using 1” margins. Number pages consecutively for the abstract, text, references, tables, and figures (in this order).

b. Submitting the manuscript. Manuscripts should be submitted online at http://mc.manuscriptcentral.com/tg. (See above for details.)

c. Title page. The page should include complete contact information for each author, including (at a minimum) affiliation, mailing address, e-mail address, and phone number. The corresponding author should be clearly designated as such.

d. Acknowledgment. If the authors choose to include acknowledgments recognizing funders or other individuals, they should be placed on a separate page immediately following the title page. These acknowledgments should be removed for the anonymous version of the manuscript.

e. Abstract and key words. On a separate page, each manuscript must include a brief abstract, double-spaced. Abstracts for research articles, Brief Reports, and Practice Concepts and Policy Analysis submissions should be approximately 200 words (the web-based system will not accept an abstract of more than 250 words), and must include the following headings: Purpose of the study, Design and Methods, Results, and Implications. Forum manuscripts must also include an abstract of about 200 words, but the headings are not necessary. Below the abstract, authors should supply three to five key words that are NOT in the title. (Please avoid elders, older adults, or other words that would apply to all manuscripts submitted to The Gerontologist.) Please note three key words must be entered in order to move forward in the online submission process.

f. Text references. Refer to the Publication Manual of the American Psychological Association (6th ed.) for style. References in text are shown by citing in parentheses the author’s surname and the year of publication. Example: “…a recent study (Jones, 1987) has shown…” If a reference has two authors, the citation includes the surnames of both authors each time the citation appears in the text. When a reference has more than two authors and fewer than six authors, cite all authors the first time the reference occurs. In subsequent citations, and for all citations having six or more authors, include only the surname of the first author followed by “et al.” Multiple references cited at the same point in the text are in alphabetical order by author’s surname.

g. Reference list. Type double-spaced and arrange alphabetically by author’s surname; do not number. The reference list includes only references cited in the text. Do not include references to private communications or submitted work. Consult the Publication Manual of the American Psychological Association (6th ed.) for correct form.

Examples:

h. Tables. Tables are to be double-spaced, numbered consecutively with Arabic numbers and have a
Caregiver Interventions

brief title for each. Place table footnotes immediately below the table, using superscript letters (a, b, c) as reference marks. Asterisks are used only for probability levels of tests of significance (*p < .05).

i. Figures/Illustrations. Please upload your figures either embedded in the word processing file or as separate high-resolution images in any of the following file formats: .jpg, .tif, .gif or .eps. For line drawings, the resolution should be 1200 d.p.i. and for color and half-tone artwork, the resolution should be 300 d.p.i. For useful information on preparing your figures for publication, go to http://cpc.cadmus.com/da.

Figures must be professionally lettered in a sans-serif type (e.g., Arial or Helvetica). All labels used in figures should be in upper case in both the figure and the caption. The journal reserves the right to reduce the size of illustrative material.

Color figures.
Please contact the production editor for information about color.

4. Types of Manuscripts Considered for Publication and Word Count

All manuscripts submitted to The Gerontologist should address practice and/or policy implications. The word limits listed below include abstract, text, and references. The word limit does not include tables and figures. All of the following manuscripts undergo the standard peer-review process, unless otherwise noted.

a. Research Articles. Most articles present the results of original research. These manuscripts may be no longer than 6,000 words. The text is usually divided into sections with the headings: Introduction, Design and Methods, Results, and Discussion. Subheads may also be needed to clarify content.


b. Brief Reports Brief reports are encouraged for significant and innovative papers that are not as long as full research articles, but are equivalent in quality. Manuscripts should be no more than 2,500 words.

c. The Forum. Timely scholarly review articles or well-documented arguments presenting a viewpoint on a topical issue are published in this section. Total length should be no more than 5,000 words.

d. Practice Concepts. A Practice Concepts manuscript describes, in 4,000 words or fewer, an innovative practice amenable to replication. Authors must clearly specify the following information about the practice: (a) uniqueness or innovation, (b) theoretical or conceptual basis, (c) essential components or features, and (d) evidence that supports replication or suggests modifications. The article should be structured to highlight these points (the structure of a research article does not necessarily apply). An important goal is to provide enough information about the practice to allow its replication.


e. Policy Studies. Policy studies manuscripts deal with aging-related public policy programs and proposed changes in those programs. Policy studies on a broad range of issues using a broad range of methodologies are welcome. The tone and style of the manuscript should be scholarly, but also easily understood and of interest to those who do not do research on the specified topic. Manuscripts should be no longer than 7,000 words. Details regarding suitable submissions for this section of the journal will be specified in an upcoming editorial (tentative publication in the December issue).
f. **Letters to the Editor.** Letters related to content in recent issues are published as space permits. Letters should reference the original article (if applicable) and be no more than 900 words. Letters are subject to review, editing, and rebuttal.

g. **Guest Editorials.** Upon occasion, the Editor-in-Chief will invite guest editorials. Unsolicited editorials are not accepted.

h. *The Gerontologist* does not publish obituaries, speeches, announcements of programs, or new product information.

5. **Book Reviews**

Book reviews are published in essay form. Reviews are prepared at the request of the Book Review Editor and are not guaranteed acceptance prior to submission. Unsolicited book review essays are not accepted. Books for review should be sent to Frank J. Whittington, PhD, Book Review Editor, Dean's Office, College of Health & Human Services, George Mason University, 4400 University Drive, MS 2G7, Fairfax, VA 22030.

6. **Copyright**

Authors of accepted manuscripts must licence copyright to The Gerontological Society of America. However, authors have unlimited rights to republish their articles in volumes they write or edit and to duplicate the material for their own use in classroom activities. When articles are republished or duplicated under these circumstances, a citation to the previous publication in *The Gerontologist* is required.

7. **Licenses, Offprints and Submissions**

It is a condition of publication in *The Gerontologist* that authors grant an exclusive license to The Gerontological Society of America. This ensures that requests from third parties to reproduce articles are handled efficiently and consistently and will also allow the article to be as widely disseminated as possible. As part of the license agreement, authors may use their own material in other publications provided that *The Gerontologist* is acknowledged as the original place of publication and Oxford University Press as the Publisher.

Upon receipt of accepted manuscripts at Oxford Journals, authors will be invited to complete an online copyright license to publish form.

Please note that by submitting an article for publication, you confirm that you are the corresponding/submitting author and that Oxford University Press ("OUP") may retain your email address for the purpose of communicating with you about the article. You agree to notify OUP immediately if your details change. If your article is accepted for publication OUP will contact you using the email address you have used in the registration process. Please note that OUP does not retain copies of rejected articles.

Information about the Creative Commons license can be found at [http://creativecommons.org/](http://creativecommons.org/).

Authors will receive electronic access to their paper free of charge. Printed offprints may be purchased in multiples of 50. Authors may purchase offprints through the author services site where they sign their online license forms.

8. **Permissions for Illustrations and Figures**

Permission to reproduce copyright material, for print and online publication in perpetuity, must be cleared and if necessary paid for by the author; this includes applications and payments to DACS, ARS and similar licensing agencies where appropriate. Evidence in writing that such permissions have been secured from the rights-holder must be made available to the editors. It is also the author's responsibility to include acknowledgements as stipulated by the particular institutions. Oxford Journals
can offer information and documentation to assist authors in securing print and online permissions: please see Guidelines for Authors at http://www.oxfordjournals.org/for_authors/. Information on permissions contacts for a number of main galleries and museums can also be provided. Should you require copies of this, please contact the editorial office of the journal in question or the Oxford Journals Rights department.

9. Funding

The following rules should be followed:

• The sentence should begin: ‘This work was supported by …’

• The full official funding agency name should be given, i.e. ‘National Institutes of Health’, not ‘NIH’ (full RIN-approved list of UK funding agencies) Grant numbers should be given in brackets as follows: ‘[grant number xxxx]’

• Multiple grant numbers should be separated by a comma as follows: ‘[grant numbers xxxx, yyyy]’

• Agencies should be separated by a semi-colon (plus ‘and’ before the last funding agency)

• Where individuals need to be specified for certain sources of funding the following text should be added after the relevant agency or grant number ‘to [author initials]’.

An example is given here: ‘This work was supported by the National Institutes of Health [AA123456 to C.S., BB765432 to M.H.]; and the Alcohol & Education Research Council [hfygr667789].’

Oxford Journals will deposit all NIH-funded articles in PubMed Central. See http://www.oxfordjournals.org/for_authors/repositories.html for details. Authors must ensure that manuscripts are clearly indicated as NIH-funded using the guidelines above.

Details of all funding sources for the work in question should be given in a separate section entitled Funding. This should appear before the Acknowledgements section.

10. Language Editing

Particularly if English is not your first language, before submitting your manuscript you may wish to have it edited for correct usage of American English. This is not a mandatory step, but may help to ensure that the academic content of your paper is fully understood by journal editors and reviewers. Language editing does not guarantee that your manuscript will be accepted for publication. If you would like information about one such service, please click here. There are other specialist language editing companies that offer similar services and you can also use any of these. Authors are liable for all costs associated with such services.

11. Advance Access

Advance Access allows for papers to be published online soon after they have been accepted for publication—reducing the time between submission and publication. Articles posted for Advance Access have been copyedited and typeset but not yet paginated for inclusion in a specific issue of the journal. Appearance in Advance Access constitutes official publication, with full-text functionality, and the Advance Access version can be cited by a unique DOI (Digital Object Identifier). The final manuscript is then paginated into an issue, at which point it is removed from the Advance Access page. Both versions of the paper continue to be accessible and citable.

12. Authors Self-Archiving/Advance Access Policy

For information about this journal’s policy, please visit our Author Self-Archiving policy page.

13. Open Access
Authors have the option, at an additional charge, to make their paper freely available online immediately upon publication, under the Oxford Open initiative. After your manuscript is accepted, as part of the mandatory online license agreement required of all corresponding authors, you will be asked to indicate whether or not you wish to pay to have your paper made freely available immediately. If you do not select the Open Access option, your paper will be published with standard subscription-based access and you will not be charged.

You can pay Open Access charges using our Author Services site. This will enable you to pay online with a credit/debit card, or request an invoice by email or post. Open access charges can be viewed here in detail; discounted rates are available for authors based in some developing countries (click here for a list of qualifying countries).

Open Access charges are in addition to any page charges and color charges that might apply. You will be issued an invoice at the time of online (advance access) publication.

Orders from the UK will be subject to the current UK VAT charge. For orders from the rest of the European Union, OUP will assume that the service is provided for business purposes. Please provide a VAT number for yourself or your institution and ensure you account for your own local VAT correctly.

14. Ethics

The Gerontologist expects that authors will observe high standards with respect to publication ethics. For example, the following practices are unacceptable: (1) falsification or fabrication of data, (2) plagiarism, including duplicate publication of the authors’ own work, in whole or in part without proper citation, (3) misappropriation of the work of others such as omission of qualified authors or of information regarding financial support. Allegations of unethical conduct will be discussed initially with the corresponding author. In the event of continued dispute the matter will be referred to the author’s institution and funding agencies for investigation and adjudication.

Oxford Journals, publisher of The Gerontologist, is a member of the Committee on Publication Ethics (COPE), and the journal strives to adhere to the COPE code of conduct and guidelines. For further information see http://www.publicationethics.org.uk.

15. New Professionals/New Reviewers

For those interested in participating in the review process for The Gerontologist, we provide an opportunity for novice reviewers. Novice reviewers are added as a third reviewer to manuscripts that we send out for peer review. These reviews are given full consideration in the editorial decision. This process gives new professionals an opportunity not only to review a manuscript, but also to experience the review process, editorial decisions, and manuscript revision process. We also hope this experience is useful in helping novice reviewers to learn how to publish in The Gerontologist. After individuals successfully complete two or more reviews, novice reviewers will become regular reviewers. All reviewers are asked to return their reviews within two weeks.

In addition to this opportunity, we also allow individuals to serve as a mentor to new professionals interested in the review process for The Gerontologist. The current review form allows for this designation so that all invited reviews can be completed with a reviewer-in-training, if interested.