Overgeneral autobiographical memory and depression in older adults: A systematic review

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Abstract

Objectives: Overgeneral autobiographical memory (OGM) is a well-researched phenomenon in working age adults with depression. However, the relevance and importance of OGM in older adult depression is not well established The aim of this review was to synthesise existing literature on OGM and depressive symptoms in older adults under the framework of the *Capture and Rumination, Functional Avoidance and Impaired Executive Control* (CaR-FA-X) model (Williams, 2006; Williams et al., 2007).

Method: Literature searches were conducted using PsychINFO, PubMed and Web of Knowledge. Eighteen articles were reviewed, grouped into three categories by design: 1) comparisons of healthy older and younger adults; 2) comparisons of older adults with and without depression; and 3) intervention studies.

Results: The literature suggests OGM is elevated in healthy older adults compared to younger adults, and further elevated in older adults with depression. Evidence supports the role of impaired executive function as a mechanism for OGM in older adults with depression, but no studies measured other components of the CaR-FA-X model (i.e. functional avoidance and rumination). Some support was found for the use of Life Review interventions to increase memory specificity and improve wellbeing.

Conclusion: OGM is prevalent in older adults and more so for those with depression, however we do not yet have a clear understanding of the underpinning mechanisms. It is recommended that future research looks at the role of functional avoidance and rumination, and at the use of memory specificity interventions being developed in the working age adult literature.

Keywords: older adults; depression; overgeneral memory; autobiographical memory

1. Introduction

Autobiographical memory is the sub-system of episodic memory that relates to personal experiences. The 'self-memory system' model (Conway & Pleydell-Pearce, 2000) describes autobiographical memories as transitory mental constructions of autobiographical knowledge, formed either as a response to cues from the environment or as a result of conscious retrieval. The ability to 'look back' at one's life using autobiographical memory is thought to serve various helpful functions in relation to well-being, including: forming a sense of identity and growth; maintaining social relationships; and learning from past experiences (see Bluck, Alea, & Ali, 2014).

1.1. Autobiographical memory and depression

Depression affects around 11% of people aged 16 to 74 at any one time in the UK (Singleton, Bumpstead, O'Brien, Lee, & Meltzer, 2001). There is strong evidence that the ability to recall autobiographical events is compromised in depression and that this impairment can maintain depressive symptoms. Dalgleish and Werner-Seidler (2014) summarise four ways in which autobiographic memory problems contribute to depression. First, there is a bias towards recalling negative events, which reinforces a pervasive negative view of the self, others and the world. Second, there is a diminished ability to access positive memories and a tendency to recall positive events in less detail. Third, there are differences in the way people with depression relate to their autobiographical memories, for example negative events may be ruminated upon, reinforcing negative ideas about the self. Finally, people with depression recall personal events in an 'overgeneral' way: memories are grouped into themes and 'chapters' rather than recalled as individual events. This overgeneral memory (OGM) effect in older adults is the main focus of the present review.

1.2. Overgeneral memory

Autobiographical memory is thought to have different degrees of specificity. Conway and Pleydell-Pearce (2000) propose a three-level hierarchical structure to the organisation of autobiographical memories. At the broadest level, memories contain general knowledge about lifetime periods, for example *"when I was at primary school"*. They then contain knowledge relating to categories of events, for example *"on school sports days"*. Finally, specific autobiographical memories contain knowledge about a single event, for example *"winning the 100-metre race when I was eleven"*. In order to retrieve a specific memory, the relevant lifetime period must first be accessed, which provides cues to the category of events, which in turn cues retrieval of specific incidents (Conway & Pleydell-Pearce, 2000).

First described by Williams and Broadbent (1986), OGM is the tendency to retrieve autobiographical information at the general, rather than specific level. Using the Autobiographical Memory Test (AMT), Williams and Broadbent (1986) asked participants to retrieve specific autobiographical memories in response to 'positive' (e.g. happy, successful) and 'negative' (e.g. angry, lonely) cue words. Compared to controls, participants who had recently attempted suicide had difficulty retrieving specific memories. The OGM phenomenon has since been extensively researched and is associated strongly with depression, as well as trauma-related disorders (for reviews, see: Sumner, 2012; Williams, 2006; Williams et al., 2007).

1.3. Overgeneral memory and depression

It is well established that adults with clinical depression have difficulty generating specific memories compared to non-depressed controls (e.g. Kuyken & Dalgleish, 1995). The effect of depressed mood on specificity remains when controlling for potential mediating factors, such as impaired executive function (Dalgleish et al., 2007). OGM has been identified as a trait marker for depression, as it is found to remain stable on remission and indicate vulnerability to ongoing depression (Brittlebank, Scott, Williams, & Ferrier, 1993). A meta-analysis looking at OGM as a predictor of the course of depression found that high OGM at baseline predicts higher depression symptoms at follow up; this effect occurs over and above the predictive value of baseline symptom severity (Sumner, Griffith, & Mineka, 2010).

1.4. CaR-FA-X model

A comprehensive theory of the mechanisms underlying OGM is the *Capture and Rumination, Functional Avoidance and Impaired Executive Control*, or CaR-FA-X, model (Williams, 2006; Williams et al., 2007). This suggests three processes that contribute, on their own or in combination, to the occurrence of OGM. First, if a memory cue is associated with negative meanings about the self, the individual may get 'captured' by this negative self-relevant idea and begin to ruminate, disrupting the search for specific memories. Second, OGM may represent a form of functional avoidance of specific memories as a way of regulating emotions; this may start as avoidance of particular (e.g. trauma-related) memories, before becoming a generalised retrieval style. Finally, reduced executive function capacity may contribute to OGM by making it difficult to maintain attention (e.g. focussing on goals) and inhibit other categories of specific and general autobiographies. Any of these mechanisms may result in the memory search being truncated at the general level, before a specific event has been identified (Williams et al., 2007).

In a comprehensive review, Sumner (2012) synthesised evidence for the mechanisms of the CaR-FA-X model drawing on studies with adult and younger adult participants Strong support was found for the link between rumination and OGM, in people with depression (Crane, Barnhofer, Visser, Nightingale, & Williams, 2007) and non-clinical populations (e.g. Raes, Watkins, Williams, & Hermans, 2008; Sutherland & Bryant, 2007). Evidence for the 'capture' mechanism appears more mixed. Self-relevant cues have been found to trigger OGM in individuals with a history of depression (e.g. Crane, Barnhofer, Mark, & Williams, 2007; Spinhoven et al., 2007); however the opposite effect – *increased* memory specificity - has been found in a non-clinical population (Sumner, Griffith, & Mineka, 2011). Sumner therefore suggests that 'capture' may only occur in the presence of negative self-schemas.

Evidence has been found for OGM as a functional avoidance strategy. The functional avoidance aspect may depend on whether OGM is defined as high memory generality, or low memory specificity. Retrieving low numbers of specific memories appears to protect against negative emotions following an aversive experience, whereas retrieving high numbers of overgeneral memories appears to *increase* distress (Raes, Hermans, Williams, & Eelen, 2006). This suggests it may be avoidance of specific negative memories that serves an affect regulation function, as opposed to OGM per se (Sumner, 2012).

In further support of the CaR-FA-X model, there is robust evidence for the relationship between impaired executive control and OGM (Sumner, 2012). Various aspects of executive

functioning have been implicated, including impaired inhibition and updating abilities (Piolino et al., 2010) and reduced working memory capacity (e.g. Neshat-Doost, Dalgleish, & Golden, 2008). Impaired executive control has been found to influence OGM in adults with depression independently of the effect of depressed mood (Dalgleish et al., 2007).

In summary, there is strong empirical support for the role of rumination and impaired executive control in OGM, but slightly more mixed evidence concerning the proposed 'capture' mechanism and the role of functional avoidance. While the CaR-FA-X model is well supported, it is not proposed as a "one size fits all" model (Crane, Barnhofer, Visser, et al., 2007; Sumner, 2012). The different mechanisms operate independently and may make different contributions to OGM in different populations. Understanding the particular mechanisms underlying OGM in different populations is important in order to develop tailored methods of intervention (Sumner, 2012).

1.5. Older adults, depression and OGM

Older adults are particularly vulnerable to depression, with around one in four people over 65 experiencing depression at any one time (Craig & Mindell, 2005). Understanding and addressing factors associated with depression is therefore an important priority in this population. There are a number of reasons to assert that the relationship between OGM and depression may be different in older adults compared to younger adults (YA). First, even in healthy aging, there are declines in executive functions such as working memory, filtering information, and metacognitive control (MacPherson, Phillips, & Della Sala, 2002; Salthouse, Atkinson, & Berish, 2003; Souchay & Isingrini, 2004; Zanto, Hennigan, Östberg, Clapp, & Gazzaley, 2010). Older adults with depression have more significant executive function impairments than non-depressed older adults (Lockwood, Alexopoulos, & van Gorp, 2002). Given the established relationship between executive function and OGM, this is likely to be significant.

Second, there are differences in the nature of autobiographical memory in healthy older adults compared to younger adults. When asked to recall different life periods, older adults show a bias towards semantic descriptions (of meanings and knowledge) that are not linked to a particular place or time, whereas younger adults provide more episodic details (Levine, Svoboda, Hay, Winocur, & Moscovitch, 2002). Older adults tend to retrieve more memories from adolescence and early adulthood than later life periods, and show more positive

associations with this time period; this 'reminiscence bump' is thought to be due to the high frequency of formative events occurring during early life (Rubin, Rahhal, & Poon, 1998). It has been suggested that over time, autobiographical memories become more integrated into a life narrative with an emphasis on meaning, rather than episodic details (Levine, 2004). These effects of aging may result in older adults naturally retrieving more memories at the 'general' level. It could also be hypothesised that OGM would be less prominent in older adults when recalling events from the 'reminiscence bump', due to the meaning of events in younger life.

Finally, there are frequent findings of a 'positivity bias' in older adults (see Carstensen et al., 2011). Despite the prevalence of depression in this group, aging is commonly associated with more positive emotional well-being and stability. It has been suggested that this occurs due to attentional and memory biases towards positively-valenced information as a means of emotion regulation (Mather & Carstensen, 2005). Older adults also retrieve more positive autobiographical memories compared to younger adults (Kennedy, Mather, & Carstensen, 2004), although this is diminished in older adults with depression (Yang & Rehm, 1993). The positivity bias may have an influence on the nature of OGM in response to different types of memory cues (positive or negative).

1.6. Current review

It is important to establish the nature of OGM in older adults with depression so that they can benefit from advances in treatment that are being developed in the OGM literature (see Dalgleish & Werner-Seidler, 2014). Interventions aimed at increasing autobiographical recall and specificity, such as Method-of-Loci (Dalgleish et al., 2013) and Memory Specificity Training (MEST) (Neshat-Doost et al., 2013; Raes, Williams, & Hermans, 2009), are showing promising outcomes in working age adults with depression. To know whether such interventions can be equally applied to helping older adults with depression, we first need to understand OGM in older adults. Research into OGM in older adults includes studies investigating differences between healthy older and younger adults, specific clinical groups (e.g. people with depression or dementia) and interventions for increasing memory specificity. The purpose of this review is to establish what is currently known about OGM in relation to depression in older adults. Key questions that the review aim to address are: 1) whether there are differences in OGM between older and younger adults in the absence of depression; 2) whether OGM is a characteristic feature and relapse marker of depression in

older adults, as in working age adults; and 3) whether interventions targeted at increasing memory specificity can be effective for treating depression in older adults. The findings are considered under the theoretical framework of the CaR-Fa-X model, and potential clinical implications are discussed.

2. Method

Literature searches were conducted using PsychNET, PubMed and Web of Knowledge (Science Citation Index and Social Science Citation Index). Three search terms and synonyms were used: 1) Older adults (old age, elderly, geriatric, gerontology), 2) Depression (depressive, mood disorder, low mood, dysthymia, anhedonia), and 3) Overgeneral memory (autobiographical memory, OGM). The date was restricted to publications from 1986 onwards, following Williams and Broadbent's (1986) original article describing OGM. Book chapters and unpublished dissertations were not included.

The search returned 253 references after removal of duplicates. Titles and abstracts were screened against the following inclusion criteria: 1) Published in English (9 excluded); 2) Described peer-reviewed, original research (24 excluded); 3) Focused on an older adult population, defined broadly as aged 50 and above (133 excluded); 4) Did not focus on populations with cognitive impairment or medical/psychiatric diagnoses apart from depression (25 excluded); 5) Employed a standardised measure of depression, not used solely for screening out participants (20 excluded); and 6) Employed a quantitative measure of OGM or autobiographical memory specificity (24 excluded). Where criteria were unclear from the title and abstract, articles were accessed in full to assess eligibility. References from included articles were examined for relevant papers, which resulted in a further 5 articles being screened; these were all excluded due to an absence of depression measures. Eighteen articles were included for full review (see Table 1).

[Insert Table 1 about here]

3. Results

3.1. Are there differences in OGM between older and younger adults in the absence of depression?

Two studies examined OGM and executive function. Ros, Latorre, and Serrano (2010) found that OA perfomed worse than YA on tasks of working memory and sustained attention, and retrieved fewer specific and more categoric memories on the AMT. Structural equation modelling showed that better working memory contributed to improved memory specificity. The authors concluded that the cognitive changes associated with aging accounted for OGM in OA. However, many of the executive function tasks employed in this study were not well-recognised or validated measures. The description of the administration of the AMT also suggests that the authors did not provide prompts when participants retrieved a general memory, which would have negatively impacted on achieved scores. Findings from Holland, Ridout, Walford, and Geraghty (2012) were not as conclusive. These authors looked at the relationship between memory specificity on the AMT and two aspects of executive control: updating (altering responses based on working memory of previous responses) and inhibition (inhibiting inappropriate responses). OA showed poorer executive functioning than YA and recalled fewer specific memories in response to neutral cues, but not to positive or negative cures. Across both groups, better updating predicted greater memory specificity. These findings support the role of executive functioning in OGM, specifically the 'updating' aspect of working memory. However, they suggest that OA have a preserved ability to retrieve specific memories with stronger emotional associations. Holland et al. (2012) suggest that such memories require less cognitive effort to retrieve, compensating for age-related declines in executive function.

Executive control has also been looked at in relation to following task instructions. Ford, Rubin, and Giovanello (2014) used a musical-cued version of the AMT to examine the impact of manipulating task instructions on OGM. Their OA and YA groups were equivalent in depression symptoms and executive function performance. Task instructions were varied so that participants were asked to recall 1) specific, 2) general, or 3) any memory. Across all conditions, OA retrieved fewer memories, a smaller proportion of specific memories and less memory detail compared to YA. Notably, OA recalled the same proportion of specific memories *regardless* of task instruction, whereas YA modified their responses, recalling more specific memories in the 'specific' condition. This suggests that OA have difficulty implementing task instructions, even in the absence of observable executive function deficits or depression. Ford et al. (2014) suggest that OA have a natural bias towards OGM due to a tendency to incorporate events into an overall life narrative, as proposed by Levine (2004). The novel musical-cued AMT used in this study was selected due to evidence that music is

particularly effective for memory retrieval. However, this limits the generalisability of Ford et al.'s (2014) findings, as it is not clear whether the same retrieval processes are used in response to visual or verbal cues.

In a study stemming from literature on self-concept, Martinelli, Anssens, Sperduti, and Piolino (2013) compared YA with healthy OA and OA with dementia on a novel word-cue memory task. 'Autobiographical episodes' (specific memories), 'personal semantics' (general knowledge about the self) and 'self-defining memories' (episodic memories related to self-concept) were recorded. Healthy OA recalled fewer specific memories than YA, however retrieval of specific 'self-defining' memories did not differ. This suggests that, despite deterioration in memory specificity, healthy OA have a preserved ability to retrieve memories at the specific level when they are highly self-relevant. Consistent with the 'positivity bias', Martinelli et al. (2013) also found that healthy OA produced more positive 'personal semantics' than YA, and having a positive self-concept was associated with more positive 'self-defining' memories. In further support of the 'positivity bias', Ros and Latorre (2010) found that healthy OA retrieved fewer negative memories in response to negative cues than YA. These findings support the idea that reduced memory specificity for negative events might be associated with better wellbeing, as suggested by Raes et al. (2006).

3.2. Is OGM a characteristic feature and relapse marker of depression in older adults?

3.2.1. Non-clinical samples

Serrano, Latorre, and Gatz (2007) found that OA with depression symptoms recalled more general memories than those without, but only for negative cues. There was no difference in specific memory recall. This indicates that OGM in OA with depression symptoms may be specific to negative memories, and occur due to increased generality rather than reduced specificty. The authors attribute this to rumination truncating the memory search at the general level. This is in line with findings that increased memory generality is associated with distress (Raes et al., 2006). Although both groups showed a bias towards positive memories, those with depression symptoms retrieved significantly more negative memories, suggesting a less pronounced 'positivity bias'. Consistent with Serrano et al. (2007), Latorre et al. (2013) found that OA with both high and low depression symptoms recalled more positive than negative memories. Both groups were also slower to recall negative than positive memories.

This further supports the 'positivity bias' and may indicate functional avoidance of specific negative memories. In contrast to Serrano et al. (2007), Latorre et al. (2013)'s high depression group produced fewer specific memories than the low depression group, with no signficant difference in general memory retrieval, indicating OGM through reduced specificity rather than increased generality. Although no relationship was found between depression scores and OGM, higher life satisfaction was associated with higher memory specificity. The authors therefore proposed that high memory specificity may be protective against depression. For both studies, participants were not prompted during the AMT following general memory recall, which is significant as this is likely to have affected the number of specific memories reported, making comparisons with other studies problematic. It is well noted that the variance in application of the AMT has a negative impact on the understanding of general versus specific memory (Rubin and Wenzel, 2002).

To explore whether OGM is a 'state' or 'trait' marker for depression in OA, Haringsma, Spinhoven, Engels, and van der Leeden (2010) compared the AMT performance of OA with remitted depression symptoms to matched healthy OA. Participants were assessed pre and post a negative mood induction. No difference was found between groups in terms of memory specificity, and although the induction successfully induced a sad mood state, it did not influence OGM in either group. To establish whether OGM was predictive of depressive relapse, Haringsma et al. (2010) followed up their OA with remitted depression at 14-17 months. They found that baseline scores and responsiveness to mood induction on the AMT did not predict new depressive episodes or depression scores at follow-up. This suggests that OGM is not sensitive to current mood state in OA, nor does it act as a marker for depression or predict relapse in OA, as it does in working age adults (e.g. Brittlebank et al., 1993). Haringsma et al. (2010) propose that the effects of normal ageing on OGM may override the detrimental effect of past depression, resulting in no observable difference between never-depressed and remitted-depressed OA. It is worth noting, however, that the 'remitted depressed' group were not a clinical sample, and prior to participating they had received an intervention for depression symptoms that addressed rumination. Given the relationship between OGM and rumination, this may have reduced OGM in Haringsma et al. (2010)'s sample.

In a study examining the 'reminiscence bump', Gidron and Alon (2007) used an adapted version of the AMT to cue for memories from different life periods. They found that specificity for memories from adolescence was negatively correlated with depression scores.

OA who scored above cut-off for depression symptoms showed reduced specificity for childhood and adolescent memories compared to those below cut-off. This suggests that depression is associated with OGM for the 'reminiscence bump', which is usually found to have positively-biased recall.

3.2.2. Clinical samples

Fromholt, Larsen, and Larsen (1995) compared OAs with first episode clinical depression, OA with dementia, and healthy controls, on a novel memory task. Participants were asked to talk freely for 15 minutes about *"events that have been important in your life"*. The number of memories, valence and level of detail was scored, along with distribution across the lifespan. OA with depression recalled fewer, less detailed memories than controls, and performed no better than OA with dementia, suggesting that depression can be as detrimental to autobiographical recall as organic cognitive impairment. The depression group also produced signficantly more memories from the recent past (during the episode of depression) and a larger proportion of negative memories for this time period than the other groups. The authors suggest that depression may make it more difficult to retrieve earlier memories due to rumination on recent negative events. Fromholt et al. (1995) followed up their group with first episode depression at 6 months to re-assess depression and performance on the free narrative memory task. Those who had recovered from their depressive episode still tended to recall more memories from the recent past, however there was no longer a bias towards negative memories. This supports 'state' rather than 'trait' theories of the effects of depression on memory, as the negativity bias was lost on recovery. However, there was no change in the detail of the memories retrieved between baseline and follow-up, indicating that remission did not improve memory specificity and OGM could potentially be a 'trait' marker of depression OA. However, the memory task administered in this study did not prompt for specific memories as in the AMT, therefore only limited conclusions can be made regarding OGM. Although interesting in terms of the effects of depressed mood on memory chronology and valence, the use of free recall and memory 'detail' as the only measure of specificity makes these findings difficult to compare with studies employing the AMT.

Birch and Davidson (2007) looked at executive function in relation to OGM. OA with depression recalled fewer specific memories than controls, but there were no significant differences in general memory recall. This suggests that there is more pronounced OGM in

depressed compared to non-depressed OA, due to reduced specificity. For both groups combined, a positive relationship was found between specific memories and working memory, and a negative relationship between general memories and working memory. However, neither age nor depression score was related to OGM. These findings support the significant role of executive functioning in OGM, over and above the influences of age and depression. Interestingly however, no difference was found between groups in terms of cognitive functioning: depressed OA recalled fewer specific memories than controls despite having preserved working memory. The authors therefore propose an added role of self-referrent rumination in depression that interrupts the memory search, although rumination was not explicitly measured. Ricarte et al. (2011) found that OA with depression recalled fewer specific memories and more general memories than controls. In contrast with Birch and Davidson (2007), this suggests that OGM occurs due to both reduced specificity *and* increased generality. OA with depression also showed greater OGM in response to negative than positive cues, potentially indicating a functional avoidance of specific negative memories. Finally, Ricarte et al. (2011) found that higher memory specificity was associated with increased life satisfaction and reduced hopelessness in their control group, suggesting that memory specificity could be protective against depression.

3.3. Are interventions targeted at memory specificity effective for treating depression in older adults?

In a study measuring memory specificity in the context of a medication trial, Gallassi, Di Sarro, Morreale, and Amore (2006) assigned OA with depression to receive one of two antidepressant therapies, and compared with matched controls. Participants were assessed for depression and cognitive performance at baseline and 6 months post-treatment. Measures included an autobiographical memory task in which participants were asked to recall memories from different life periods. Memories were scored for content and level of detail. At baseline, OA with depression showed poorer performance on the autobiographical memory task and on working memory tasks. Following treatment, those in remission showed improvements in autobiographical memory and working memory. These findings suggest that depression in OA affects various aspects of memory, including the autobiographical memory specificity, and that much of this impairment improves on remission from the depressed state. However, performance of the remitted participants remained signficantly worse than controls,

suggesting residual autobiographical memory problems that might indicate a depressive 'trait'. It must be noted that OGM was not the primary focus of this trial, which looked at various cognitive factors. As such, the autobiographical memory task is briefly described and it is difficult to ascertain how this compares to other measures of OGM.

de Medeiros, Mosby, Hanley, Pedraza, and Brandt (2011) randomly assigned their community sample to either an autobiographical writing intervention, an oral reminiscence intervention, or an inactive control group. Paticipants were assessed pre and post-intervention and at 6 month follow-up using measures of autobiographical memory, depression and wellbeing. Compared to the control group, neither intervention led to significant improvements in recall for specific autobiographical incidents, memory detail, or depression score. However, while the interventions involved recalling autobiographical memories, they did not explicitly target memory specificity. Additonally, the authors note that their autobiographical memory tasks are usually used with people with cognitive impairment, therefore may not have been sensitive to change in a non-clinical sample (de Medeiros et al., 2011).

In a study using the AMT, Ramirez, Ortega, Chamorro, and Colmenero (2014) allocated their OA community sample to either a Life Review intervention focused on memory specificity, gratitude and forgiveness, or a placebo focused on general early life memories. Participants were assessed pre and post intervention and at 4 month follow-up using the AMT, measures of depression and wellbeing. A significant reduction in depression and an increase in life satisfaction and happiness was found following the Life Review intervention, but not in the placebo group. There was also a significant increase in specific memory retrieval in the intervention group, but not placebo group. This suggests that a Life review intervention explicitly focused on memory specificity can improve OGM and mood in OA. However, the gains found post-intervention were not maintained at follow-up. The authors also did not explicitly look at the relationship between change in depression score and change in OGM, therefore it cannot be inferred whether the increased memory specificity led to improvements in mood. As the intervention targeted 'gratitude' and 'forgiveness' as well as memory specificity, it is not possible to separate which part was helpful.

Goncalves, Albuquerque, and Paul (2009) allocated OA with depressive symptoms to either a Life Review intervention or inactive control group. Participants were assessed pre and post intervention using the AMT and measures of depression and life satisfaction. They found that

both groups demonstrated an increase in specific and positive memories on the AMT, however this was only significant in the intervention group. There were also greater improvements in depression & life satisfaction scores in the intervention group. This supports the use of Life Review to increase memory specificity and improve depression symptoms. However, the conclusions that can be drawn are limited due to the lack of an active control and follow-up period. This study also employed a very small sample and does not report the demographics of the two groups separately. Further, nly the data for significant findings are provided, so the magnitude of the differences between the Life Review and control groups is unclear.

The final two studies were conducted by the same research group. Serrano, Latorre, Gatz, and Montanes (2004) allocated OA with depression symptoms to a Life Review intervention or inactive control group. Participants were assessed pre and post intervention using the AMT, depression, hopelessness and life satisfaction measures. Consistent with Goncalves et al. (2009), a significant reduction in depression and hopelessness and an increase in life satisfaction was found following intervention, but not in the control group. A significant increase in specific memories was found in the intervention group, and Serrano et al. (2004) also looked at the relationship between changes in OGM and depression scores. They found that change in memory specificity was a significant predictor of post-intervention hopelessness and life-satisfaction (and nearly significant for depression), when controlling for baseline scores. Although the direction of the relationship cannot be concluded, this finding supports the relationship between improved memory specificty and improved mood. Serrano Selva et al. (2012) addressed methodological limitations of the group's earlier trial by employing a clinical sample, an active control of supportive therapy, and follow-ups at 6 weeks and 6 months. Participants randomised to receive the Life Review intervention did not improve any more than the control group in terms of depression score, hopelessness or life satisfaction. However, in the intervention group, there was an increase in specific memories and this was associated with improved depression scores. These changes were maintained at follow-up. Those who produced more specific memories reported a more rapid reduction in depression scores, suggesting that increased memory specificity may be a mechanism for improvement in depression. Overall, the findings of Serrano and colleagues indicate that Life Review can successfully increase memory specificity and this is associated with improvements in mood and wellbeing. However, Life Review may not be more successful than other forms of therapy at improving depression symptoms.

4. Discussion

This review aimed to establish what is currently known about OGM in relation to depression in older adults, and to identify potential clinical and research implications.

4.2. Older adults and OGM

The findings from studies comparing healthy older and younger adults provide evidence that, in the absence of depression, older adults have increased OGM compared to younger adults. At least part of this effect appears due to age-related declines in executive functioning, with both working memory (Ros et al., 2010) and 'updating' of the memory search (Holland et al., 2012) identified as possible mechanisms. This supports the role of reduced executive function capacity in OGM, as proposed by the CaR-FA-X model (Williams, 2006; Williams et al., 2007), and suggests this element of the model is especially relevant to older adults.

Executive function problems alone cannot account for the OGM effect in older adults, however, as there are findings that OGM occurs in the absence of working memory deficits (or depression; Ford et al., 2014) and that memory specificity to emotional cues is preserved in the presence of reduced working memory (Holland et al., 2012). To account for this, Ford et al. (2014) point to an age-related tendency to incorporate memories into a single life narrative, leading to overgeneral recall. The retrieval of specific memories that are emotionally-valenced (Holland et al., 2012) and self-referrent (Martinelli et al., 2013) appears relatively preserved in healthy older adults. Therefore, it may be that memories that are highly related to older adults' integrated self-concept are retrieved more automatically, overcoming age-related declines in executive function.

The evidence reviewed in healthy older adults is consistent with the concept of a 'positivity bias', with findings that older adults retrieve fewer specific negative memories than younger adults (Ros & Latorre, 2010) and that a positive self-concept improves retrieval for specific positive memories (Martinelli et al., 2013). This also supports the idea that OGM in the form of reduced memory specificity to negative events might be beneficial to wellbeing (Raes et al., 2006).

4.3. Older adults, depression and OGM

Studies comparing healthy older adults to those with depression symptoms suggest, with one exception (Haringsma et al., 2010), that depression is associated with increased OGM in older adults, as it is in working age adults. However, the literature is equivocal as to whether this occurs due to increased memory generality (Serrano et al., 2007), reduced specificity (Birch & Davidson, 2007; Latorre et al., 2013), or a combination of both (Ricarte et al., 2011). In line with the association between OGM and depression, there is evidence that higher memory specificity is associated with increased well-being in older adults (Latorre et al., 2013; Ricarte et al., 2011) and may therefore be protective against depression.

As well as contributing to OGM, depression appears to slow down older adults' memory search (Latorre et al., 2013; Serrano et al., 2007), which could be a result of reduced working memory capacity. The evidence from Birch and Davidson (2007) further supports the importance of working memory suggested by the CaR-FA-X model, indicating that this has an effect on OGM that is independent of depression or age. However, increased OGM was found to occur in older adults with depression in the absence of working memory impairment (Birch & Davidson, 2007), suggesting that OGM in this population cannot be solely attributed to mood-related impairments in executive functioning. OGM appears most pronounced in response to negative memory cues (Ricarte et al., 2011; Serrano et al., 2007). In line with the CaR-FA-X model (Williams, 2006; Williams et al., 2007), it is likely that older adults with depression ruminate on negative self-referent information, disrupting specific memory retrieval.

In contrast to findings that OGM is a stable 'trait' marker for depression in working age adults (e.g. Brittlebank et al., 1993), in older adults OGM does not appear to remain stable on remission from depression, to respond to negative mood states, or predict depressive relapse (Haringsma et al., 2010). However, these factors have been investigated by only one study, which had notable limitations. By comparison, Fromholt et al. (1995) found that low levels of memory detail remained stable on remission from depression.

In terms of older adult memory phenomena, there is evidence that older adults with depression lose the 'reminiscence bump' of enhanced recall for adolescent events (Gidron & Alon, 2007), and that the 'positivity bias' in memory retrieval is diminished (Latorre et al., 2013; Serrano et al., 2007). Consistent with the CaR-FA-X model (Williams et al, 2007), this suggests that OGM acts as a method of avoiding specific memories from this time period to regulate emotions through the truncation of a bottom down memory search to avoid the

activation of associated, specific autobiographical memories. It is well established that difficult experiences in childhood and adolescents are associated with childhood and adulthood depression (see Birmaher et al, 1996); it would thus be adaptive to have less specific recall of events for this life period when they are predominantly negative, in the same way that it would be adaptive to have more specific recall from this period when events are predominantly positive, as in the case of the 'reminiscence bump' cognitive bias. Older adults with depression instead appear to demonstrate a bias towards recalling more recent, negative events (Fromholt et al., 1995). Although obstensibly a paradox, it is diffiuclt to interpret the findings in relation to the CaR-FA-X model as it is not known whether the reported memories in this study were specific or overgeneral. It may be that attenuated executive capacity in depressed older adults results in reduced capacity for functional avoidance of all negative memories, whether these be associated earlier life events or not. This raises the important possibility that OGM applies more strongly to earlier negative life. This is consistent with the observation that when depressed people are experiencing negative automatic thoughts they are readily able to substantiate them with specific examples from recent life situations(Beck, 1979).

5. Clinical implications

Studies of Life Review interventions support the use of this approach for improving memory specificity, depression symptoms and wellbeing in older adults. However, the only adequately controlled trial in a clinical sample (Serrano Selva et al., 2012) did not find any significant benefit of Life Review over supportive therapy. Additionally, the finding that autobiographical memory improves on remission of depression through antidepressant treatment (Gallassi et al., 2006) suggests that OGM may improve as a consequence of reduced depressive symptoms, rather than improvements in OGM leading to reductions in depression. Intervening by targeting OGM in older adults therefore does not appear necessary to reduce depression. However, the limited evidence to date suggests that increasing memory specificity may be one mechanism through which depression can be improved in this client group. This is in line with findings in the general adult literature that interventions targeting memory specificity, such as MEST, can improve both memory specificity and depression symptoms (Dalgleish & Werner-Seidler, 2014).

6. *Implications for research*

In terms of methodological issues, researchers looking at OGM in older adults need to adopt standardised procedures for administering the AMT to allow comparison between studies. This would also faciliate future systematic and meta-analytic review. When isolating the relationship between depression and OGM, it is important to ensure that other problems that might influence OGM (e.g. cognitive impairment, PTSD and antidepressant medications) are adequately screened and controlled for.

It was notable that few of the reviewed papers (Ford et al., 2014; Ricarte et al., 2011; Ros et al., 2010) cited the CaR-FA-X model, despite the dominance of this theoretical framework in the wider OGM literature. Research is needed to look more explicitly at different factors of the CaR-FA-X model in this client group, especially rumination and functional avoidance, but also executive functioning. There is a substantial line of research into rumination and repetitive thinking (see Watkins, 2008), which has ledto the development of interventions such as Rumination-focused Cognitive Behavioural Therapy (RF-CBT; Watkins et al., 2011). Establishing the relationship between rumination and OGM in older adults would enable more joined-up thinking around clinical approaches. Further longitudinal research would also be beneficial in order to establish whether OGM is a stable 'trait' marker of depression in older adults, and whether OGM can predict depressive relapse in this group.

Finally, there is a need for further clinical trials to help draw firmer conclusions regarding the efficacy and mechanisms of action of Life Review interventions. Ideally, trials are needed on a larger scale and with more in-depth analysis of mediating factors. In progressing this research, it would seem beneficial to draw on the literature on memory specificity interventions being developed in the wider research. Although the two lines of research have evolved separately, they have converged on similar conclusions around the potential benefits of increasing memory specificity as an intervention for depression.

7. *Limitations*

The inclusion criteria for this review were kept broad due to the relatively low numbers of available articles. As a result, there was great heterogeneity in the studies reviewed in terms

of the methodology, quality and samples. Although the literature searches were conducted using a systematic procedure, the current review does not claim to be exhaustive and it did not include a search of the grey literature. The definition of the 'older adult' population as 50 years and over is a particular limitation. It was initially intended to define the population as 65 years and over, in line with commonly accepted criteria for older adult services in the UK. However from an initial screen of the search results, it was clear that this would leave few articles and exclude many of relevance.

8. Summary

Clear evidence was found that OGM occurs in older adults in the absence of depression, due partly to changes in executive functioning associated with healthy aging. There is also suggestion that OGM in healthy older adults reflects a tendency to integrate memories in terms of self-relevance and a bias against retrieval of specific negative memories. In this respect, OGM in older adults could be considered beneficial to wellbeing in some circumstances, rather than a marker of emotional distress. However, in line with the literature in younger adults, there was strong evidence that the presence of depression in older adults increases OGM. This appears due in part to the effects of depressed mood on executive functioning, as well as possible changes in the relationship individuals with depression have to negative memories. However, the role of rumination and functional avoidance mechanisms in OGM in older adults has not been adequately investigated. It is also unclear to what extent OGM acts as a marker for recurrent depression in older adults and further research is needed. In terms of clinical implications, there is some support for the use of Life Review interventions for increasing memory specificity and improving depression symptoms.

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Table 1

Study	Location	Sample	Gender	Ages	Depression Measure	OGM Measure	Other Measures
Differences in OGM between older and younger adults in the absence of depression							
Ford, Rubin, and Giovanello (2014)	USA	1. YA (N=25) 2. OA (N=21), within subjects	1. 10 male, 15 female 2. 10 male, 11 female	1. M= 18.7, SD= 0.76, 2. M= 75.6, SD= 5.97	Beck Depression Inventory (BDI): Used to check group equivalence	Novel musical cue task	Executive function tasks: Stroop, N-back, Number-Letter switching
Holland, Ridout, Walford, and Geraghty (2012)	UK	1. YA (N=25) 2. OA (N=21)	Not available	1. 18-35, M=21.6, SD= 4.65 2. 55-87, M=69.52, SD= 10.52	Hospital Anxiety and Depression Scale (HADS): Used to compare groups and controlled for in analyses	AMT	Random Number Generation (measures of inhibition and updating)
Martinelli, Anssens, Sperduti, and Piolino (2013)	France	1. YA (N=18) 2. OA (N=16) 3. OA with dementia (N=10	1. 8 male, 10 female 2. 6 male, 10 female 3. 1 male, 9 female	1. M= 22.16, SD= 1.92 2. M= 75.18, SD= 4.61 3. M= 76.30, SD= 4.01	BDI: Used to exclude if score 14+, and entered as covariate in analyses.	Word cued recall of 'autobiographical episodes', 'personal semantics' and 'self-defining memories'	Tennessee Self-Concept Scale
Ros and Latorre (2010)	Spain	1. YA (N=50)	1. 21 male, 29 female	1. 23-30, M=26.59, SD=2.07	Center for Epidemiological Studies-	AMT (valence only reported)	None

		2. OA (N=46)	2. 11 male, 35 female	2. 57-80, M=65.98, SD= 5.54	Depression scale (CES-D): Used as covariate in analyses		
Ros, Latorre, and Serrano (2010)	Spain	As above	As above	As above	As above	AMT	Measures of Working Memory, Short Term Memory and Sustained Attention
OGM as a characteristic feature and relapse marker of depression in older adults							
Gidron and Alon (2007)	Israel	OA (N=25)	12 male, 13 female	65-89, M=77.92, SD=6.5	Geriatric Depression Scale-15 items (GDS-15): Cut-off 7 for inclusion	AMT, adapted to cue for life periods	None
Haringsma, Spinhoven, Engels, and van der Leeden (2010)	Holland	1. OA with remitted depression (N=63) 2. OA with no history of depression (N=60) T1. Baseline T2. Post mood-induction.	1. 15 male, 48 female, 2. 13 male, 47 female	1. 55-86, M=64.92, SD=6.84 2. 55-86, M=64.47, SD=6.65	MINI diagnostic interview CES-D	AMT	Visual Analogue Mood Scale

Latorre et al. (2013)	Spain	1. OA with high depression symptoms (N= 33) 2. OA with low depression symptoms (N= 33)	1. 14 male, 19 female 2. 12 male, 21 female	1. M= 72.09, SD= 7.88 2. M= 72.52, SD= 5.61	CIDI diagnostic interview CES-D : Cut-off 16 for group allocation	AMT	Life Satisfaction Index
Serrano, Latorre, and Gatz (2007)	Spain	1. OA with depression symptoms (N=95) 2. OA without depression symptoms (N=90)	77 male, 108 female	60+, M= 72.21, SD= 7.56	CES-D: Cut-off 16 for group allocation)	AMT	None
Birch and Davidson (2007)	UK	1. OA with depression (N=17) 2. OA without depression (N=17)	1. 4 male, 13 female 2. 6 male, 11 female	1. 65+, M=71.5, SD=4.7 2. 65+, M=73.9, SD= 5.1	GDS-30: Cut off 14	AMT	Wechsler Memory Scale III, Working Memory Index, Mini Mental State Exam (MMSE), Wechsler Test of Adult Reading
Fromholt, Larsen, and Larsen (1995)	Denmark	1. OA with first episode depression (N=15) 2. OA with dementia (N=30)	1. 2 male, 13 female 2. 5 male, 25 female	1. 72-90, M= 80.2, SD= 5.27 2. 73-89, M= 80.5, SD= 4.36	Clinical diagnosis according to DSM-III	Free recall narrative on "events that have been important in your life"	Brief Cognitive Rating Scale: Used to check for cognitive decline in depression group

		3. Healthy OA (N=30)	3. 12 male, 18 female	3. 71-89, M=78.3, SD= 4.81			
Ricarte et al. (2011)	Spain	1. OA with depression (N=34) 2. OA without depression (N=34)	1. 5 male, 29 female 2. 7 male, 27 female	1. 65+, M= 74.59, SD=5.48 2. 65+, M=75.09, SD=7.56	MINI diagnostic interview	AMT	Life Satisfaction Index, Beck Hopelessness Scale
Interventions targeted at increasing memory specificity in depressed older adults							
de Medeiros, Mosby, Hanley, Pedraza, and Brandt (2011)	USA	OA (non-clinical) 1. Autobiographical Writing Group (N=18) 2. Oral Reminiscence Group (N=18) 3. Control Group (N=15) T1. Baseline T2. Post-intervention T3. 26 week follow-up.	1. 7 male, 11 female 2. 6 male, 12 female 3. 7 male, 8 female	1. 67-88, M79.6, SD=6.1 2. 71-96, M=81.5, SD=5.9 3. 73-87, M=81.1, SD=4.0	GDS-15	Autobiographical Memory Interview ('autobiographical incidents') Remote Memory Word Association Task ('episodic specificity')	Hopkins Verbal Learning Test, Brief Visuo-spatial Memory Test, Short Form-36, NEO Five-Factor Inventory, Tennessee Self-Concept Scale
Gallassi, Di Sarro, Morreale, and Amore (2006)	Italy	1. OA with depression (N=48), assigned to either a. Fluoxetine (N=24) b.Reboxetine (N=24) 2. Matched Healthy	1. 12 male, 36 female 2. 6 male,	1. 50+, M=67.54, SD=8.08 2. 50+, M=69.33,	Clinical Diagnosis Hamilton Rating Scale GDS-30	Autobiographical Memory interview (content and detail of memories)	WMS, Familial/Famous Face Recognition, Attentional Matrices, Stem Completion, MLT '88 test for

		OA (N=15). T1. Baseline T2. 6m of treatment	9 female.	SD=5.49			Historic Events.
Goncalves, Albuquerque, and Paul (2009)	Portugal	OA with depression symptoms 1. Life Review Intervention Group (N=11) 2. Control Group (N=11) T1. Baseline T2. Post-intervention	22 female	65+, M=80.7, SD= 4.5	GDS-15: Cut-off 4 for study inclusion	AMT	Life Satisfaction Index
Ramirez, Ortega, Chamorro, and Colmenero (2014)	Spain	OA 1. Life Review Intervention Group (N=26) 2. Placebo Group (N=20) T1. Baseline T2. Post-intervention T3. 4m follow-up.	1. 10 male, 16 female 2. 7 male, 13 female	60-93, M=71.18, SD= 7.06	BDI	AMT	State and Trait Anxiety Inventory, Life Satisfaction Scale, Subjective Happiness Scale

Serrano, Latorre, Gatz, and Montanes (2004)	Spain	OA with depression symptoms 1. Life Review Intervention Group (N=20) 2. Control Group (N=23) T1. Baseline T2. Post-intervention	10 male, 33 female	65-93, M=77.19, SD=7.68	CIDI diagnostic interview for caseness CES-D for inclusion: Cut-off 16	AMT	Life Satisfaction Index, Beck Hopelessness Scale
Serrano Selva et al. (2012)	Spain	OA with depression 1. Life Review Intervention Group (N= 18) 2. Placebo Group (N=19) T1. Baseline T2. Post-intervention T3. 6 week follow-up T4. 6m follow-up.	6 male, 31 female	64-83, M=73.9	MINI diagnostic interview GDS-30	AMT	Beck Hopelessness Scale, Life Satisfaction Index, Quality of Life in Depression Scale

Overgeneral autobiographical memory and depression in older adults: A systematic review

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Abstract

Objectives: Overgeneral autobiographical memory (OGM) is a well-researched phenomenon in working age adults with depression. However, the relevance and importance of OGM in older adult depression is not well established The aim of this review was to synthesise existing literature on OGM and depressive symptoms in older adults under the framework of the *Capture and Rumination, Functional Avoidance and Impaired Executive Control* (CaR-FA-X) model (Williams, 2006; Williams et al., 2007).

Method: Literature searches were conducted using PsychINFO, PubMed and Web of Science. Eighteen articles were reviewed, grouped into three categories: 1) comparisons of healthy older adults and adults of working age; 2) comparisons of older adults with and without depression; and 3) intervention studies.

Results: OGM is elevated in healthy older adults compared to adults of working age, and further elevated in older adults with depression. Evidence supports the role of impaired executive function as a mechanism for OGM in older adults with depression, but no studies measured other components of the CaR-FA-X model (i.e. functional avoidance and rumination). Some support was found for the use of Life Review interventions to increase memory specificity and improve wellbeing.

Conclusion: OGM is prevalent in older adults and more so for those with depression, however there is no clear understanding of the underpinning mechanisms. It is recommended that future research looks at the role of functional avoidance and rumination, and at the use of memory specificity interventions being developed in the working age adult literature.

Keywords: older adults; depression; overgeneral memory; autobiographical memory

1. Introduction

Autobiographical memory is the sub-system of episodic memory that relates to personal experiences. The 'self-memory system' model describes autobiographical memories as transitory mental constructions of autobiographical knowledge, formed either as a response to cues from the environment or as a result of conscious retrieval (Conway & Pleydell-Pearce, 2000). The ability to 'look back' at one's life using autobiographical memory is thought to serve various helpful functions in relation to well-being, including: forming a sense of identity and growth; maintaining social relationships; and learning from past experiences (see Bluck, Alea, & Ali, 2014) and reminiscence therapies, particularly life review, are effective at improving psychological well-being in older adults (Bohlmeijer, Roemer, Cuijpers, & Smit, F, 2007).

1.1. Autobiographical memory, overgeneral memory and depression

There is strong evidence that the ability to recall autobiographical events is compromised in depression and that this impairment can maintain depressive symptoms (Sumner, 2012; Williams et al, 2007). Dalgleish and Werner-Seidler (2014) summarise four ways in which autobiographic memory problems contribute to depression. First, there is a bias towards recalling negative events, which reinforces a pervasive negative view of the self, others and the world. Second, there is a diminished ability to access positive memories and a tendency to recall positive events in less detail. Third, there are differences in the way people relate to their autobiographical memories, for example negative events may be ruminated upon, reinforcing negative ideas about the self. Finally, people recall personal events in an 'overgeneral' way: memories are grouped into themes and 'chapters' rather than recalled as individual, specific events.

Overgeneral memory is typically measured using the Autobiographical Memory Test (AMT)(Williams and Broadbent,1986). Participants are asked to retrieve specific autobiographical memories in response to 'positive' (e.g. happy, successful) and 'negative' (e.g. angry, lonely) cue words. It is well established that adults with clinical depression have difficulty generating specific memories compared to non-depressed controls (e.g. Kuyken & Dalgleish, 1995). The effect of depressed mood on specificity remains when controlling for potential mediating factors, such as impaired executive function (Dalgleish et al., 2007).

OGM has been identified as a trait marker for depression, as it is found to remain stable on remission and indicate vulnerability to ongoing depression (Brittlebank, Scott, Williams, & Ferrier, 1993). A meta-analysis looking at OGM as a predictor of the course of depression found that high OGM at baseline predicts higher depression symptoms at follow up; this effect occurs over and above the predictive value of baseline symptom severity (Sumner, Griffith, & Mineka, 2010).

A comprehensive theory of the mechanisms underlying OGM is the *Capture and Rumination, Functional Avoidance and Impaired Executive Control*, or CaR-FA-X, model (Williams, 2006; Williams et al., 2007). This suggests three processes that contribute, on their own or in combination, to the occurrence of OGM. First, if a memory cue is associated with negative meanings about the self, the individual may get 'captured' by this negative self-relevant idea and begin to ruminate, disrupting the search for specific memories. Second, OGM may represent a form of functional avoidance of specific memories as a way of regulating emotions; this may start as avoidance of particular (e.g. trauma-related) memories, before becoming a generalised retrieval style. Finally, reduced executive function capacity may contribute to OGM by making it difficult to maintain attention (e.g. focussing on goals) and inhibit other categories of specific and general autobiographies. Any of these mechanisms may result in the memory search being truncated at the general level, before a specific event has been identified (Williams et al., 2007).

There is strong empirical support for the role of rumination and OGM in people with depression (Crane, Barnhofer, Visser, Nightingale, & Williams, 2007; Watkins and Teasdale, 2001) and non-clinical populations (e.g. Raes, Watkins, Williams, & Hermans, 2008; Sutherland & Bryant, 2007). Evidence has been found for OGM as a functional avoidance strategy. The functional avoidance aspect may depend on whether OGM is defined as high memory generality, or low memory specificity. Retrieving low numbers of specific memories appears to protect against negative emotions following an aversive experience, whereas retrieving high numbers of overgeneral memories appears to *increase* distress (Raes, Hermans, Williams, & Eelen, 2006). This suggests it may be avoidance of specific negative memories that serves an affect regulation function, as opposed to OGM per se (Sumner, 2012). In further support of the CaR-FA-X model, there is robust evidence for the relationship between impaired executive control and OGM (Sumner, 2012). Various aspects of executive functioning have been implicated, including impaired inhibition and updating abilities (Piolino et al., 2010) and reduced working memory capacity (e.g. Neshat-Doost,

Dalgleish, & Golden, 2008). Impaired executive control has been found to influence OGM in adults with depression independently of the effect of depressed mood (Dalgleish et al., 2007). While the CaR-FA-X model is well supported, it is not proposed as a "one size fits all" model (Crane, Barnhofer, Visser, et al., 2007; Sumner, 2012). The different mechanisms operate independently and may make different contributions to OGM in different populations. Understanding the particular mechanisms underlying OGM in different populations is important in order to develop tailored methods of intervention (Sumner, 2012).

1.2. Older adults, OGM and depression

Older adults are particularly vulnerable to depression, with around one in four people over 65 experiencing depression at any one time (Craig & Mindell, 2005). Understanding and addressing factors associated with depression is therefore an important priority in this population. There are a number of reasons to believe that the relationship between OGM and depression may be different in older adults compared to AWA. First, in healthy aging, there are declines in executive functions such as working memory, filtering information, and metacognitive control (MacPherson, Phillips, & Della Sala, 2002; Salthouse, Atkinson, & Berish, 2003; Souchay & Isingrini, 2004; Zanto, Hennigan, Östberg, Clapp, & Gazzaley, 2010). Further, older adults with depression have more significant executive function impairments than non-depressed older adults (Lockwood, Alexopoulos, & van Gorp, 2002). Given the established relationship between executive function and OGM, this is likely to be significant.

Second, there are differences in the nature of autobiographical memory in healthy older adults compared to AWA. When asked to recall different life periods, older adults generally show a bias towards semantic descriptions (of meanings and knowledge) that are not linked to a particular place or time, whereas AWA provide more episodic details (Levine, Svoboda, Hay, Winocur, & Moscovitch, 2002). Both AWA and older adults tend to retrieve more memories from adolescence and early adulthood than later life periods - the 'reminiscence bump' (Rubin, Wetzler, & Nebes, 1986) - which is thought to be due to the high frequency of formative events occurring during early life (Rubin, Rahhal, & Poon, 1998). In contrast to the general tendency to recall semantic versus episodic memories, when recalling memories from the 'reminiscence bump' period, older adults report more specific autobiographical

memories (Piolino et al, 2006), but this specificity appears to be inversely related to depressed mood (Gidron and Alon, 2007).

Despite the prevalence of depression in the older adult population and ageing being widely associated with 'decrepitude'-or at least in western cultures-research consistently demonstrates that later life is associated with more positive emotional well-being and stability (e.g. Carstensen et al, 2011). This is partly explained by the frequent findings of a 'positivity effect' in older adults (Carstensen and Mikels, 2005; Mather and Carstensen, 2005), where attention and memory are biased towards positively-valenced information, acting as a means of emotion regulation. For example, in a dot-probe paradigm, older adults responded more quickly to positive stimuli than negative stimuli compared to AWAs, who did not demonstrate a differential response to positive or negative stimuli (Marther and Cartensen, 2003). Similarly, older adults' working memory for positive, compared to negatively valenced stimuli, is superior, whereas the reverse is true for AWAs (Mikels, Larkin, Reuter-Lorenze and Carstensen, 2005). Further, in a study requiring older adults to report information on various well-being indices that they had also completed 15 years earlier, a similar 'positivity effect' in recall was found (Kennedy, Mather, & Carstensen, 2004). That is, participants reported their situations to have been better than they did at the time. It should be noted, however, that participants were not being asked to report or recall episodic memories as is typically the case in autobiographical memory research.

1.3. Current review

It is important to understand OGM in older adults with depression so that they can benefit from advances in treatment that are being developed to address retrieval problems in autobiographical memory (see Dalgleish & Werner-Seidler, 2014). Interventions aimed at increasing autobiographical recall and specificity, such as using the Method-of-Loci (Dalgleish et al., 2013) and Memory Specificity Training (MEST) (Neshat-Doost et al., 2013; Raes, Williams, & Hermans, 2009) are showing promising outcomes in AWA with depression. To know whether such interventions can be equally applied to helping older adults with depression, we first need to understand OGM in older adults. Research into OGM in older adults includes studies investigating differences between healthy older and AWA, specific clinical groups (e.g. people with depression or dementia) and interventions for increasing memory specificity. The purpose of this review is to establish what is currently

known about OGM in relation to depression in older adults. Key questions that the review aim to address are: 1) whether there are differences in OGM between older and AWA in the absence of depression; 2) whether OGM is a characteristic feature and relapse marker of depression in older adults, as in working age adults; and 3) whether interventions targeted at increasing memory specificity can be effective for treating depression in older adults. The findings are considered under the theoretical framework of the CaR-FA-X model, and potential clinical implications are discussed.

2. Method

Literature searches were conducted using PsychNET, PubMed and Web of Science (Science Citation Index and Social Science Citation Index). Three search terms and synonyms were used: 1) Older adults (old age, elderly, geriatric, gerontology), 2) Depression (depressive, mood disorder, low mood, dysthymia, anhedonia), and 3) Overgeneral memory (autobiographical memory, OGM). The searches were conducted in January 2015 and the date was restricted to publications from 1986 onwards, following Williams and Broadbent's (1986) original article describing OGM. Book chapters and unpublished dissertations were not included.

A flow diagram of the article selection process is presented in Figure 1. The database search returned 253 references after removal of duplicates. Titles and abstracts were initially screened against inclusion criteria and where eligibility was unclear, articles were accessed in full. The inclusion criteria were: 1) Published in English (9 excluded); 2) Described peer-reviewed, original research (24 excluded); 3) Focused on an older adult population, defined broadly as aged 50 and above (133 excluded); 4) Did not focus on populations with cognitive impairment or medical/psychiatric diagnoses apart from depression (25 excluded); 5) Employed a standardised measure of depression, not used solely for screening out participants (20 excluded); and 6) Employed a quantitative measure of OGM or autobiographical memory specificity (24 excluded). References from included articles were examined for relevant papers, which resulted in a further 5 articles being screened; these were all excluded due to an absence of depression measures. Eighteen articles were included for full review.

[Insert Figure 1 about here]

[Insert Table 1 about here]

3. Results

3.1. Are there differences in OGM between older adults and AWA in the absence of depression?

Two studies examined OGM and executive function. Ros, Latorre, and Serrano (2010) found that OA perfomed worse than AWA on tasks of working memory and sustained attention, and retrieved fewer specific and more categoric memories on the AMT. Structural equation modelling showed that better working memory contributed to improved memory specificity. The authors concluded that the cognitive changes associated with aging accounted for OGM in OA. However, many of the executive function tasks employed in this study were not well-recognised or validated measures. The description of the administration of the AMT also suggests that the authors did not provide prompts when participants retrieved a general memory, which would have negatively impacted on achieved scores. Findings from Holland, Ridout, Walford, and Geraghty (2012) were not as conclusive. These authors looked at the relationship between memory specificity on the AMT and two aspects of executive control: updating (altering responses based on working memory of previous responses) and inhibition (inhibiting inappropriate responses). OA showed poorer executive functioning than AWA AWAand recalled fewer specific memories in response to neutral cues, but not to positive or negative cures. Across both groups, better updating predicted greater memory specificity. These findings support the role of executive functioning in OGM, specifically the 'updating' aspect of working memory. However, they suggest that OA have a preserved ability to retrieve specific memories with stronger emotional associations. Holland et al. (2012) suggest that such memories require less cognitive effort to retrieve, compensating for age-related declines in executive function.

Executive control has also been looked at in relation to following task instructions. Ford, Rubin, and Giovanello (2014) used a musical-cued version of the AMT to examine the impact of manipulating task instructions on OGM. Their OA and YA groups were equivalent in depression symptoms and executive function performance. Task instructions were varied so that participants were asked to recall 1) specific, 2) general, or 3) any memory. Across all conditions, OA retrieved fewer memories, a smaller proportion of specific memories and less memory detail compared to AWA. Notably, OA recalled the same proportion of specific

memories *regardless* of task instruction, whereas AWA modified their responses, recalling more specific memories in the 'specific' condition. This suggests that OA have difficulty implementing task instructions, even in the absence of observable executive function deficits or depression. Ford et al. (2014) suggest that OA have a natural bias towards OGM due to a tendency to incorporate events into an overall life narrative, as proposed by Levine (2004). The novel musical-cued AMT used in this study was selected due to evidence that music is particularly effective for memory retrieval, this limits the generalisability of the findings: it is not clear whether the same retrieval processes are used in response to visual or verbal cues.

In a study stemming from literature on self-concept, Martinelli, Anssens, Sperduti, and Piolino (2013) compared AWA with healthy OA and OA with dementia on a novel word-cue memory task. 'Autobiographical episodes' (specific memories), 'personal semantics' (general knowledge about the self) and 'self-defining memories' (episodic memories related to self-concept) were recorded. Healthy OA recalled fewer specific memories than AWA, however retrieval of specific 'self-defining' memories did not differ. This suggests that, despite deterioration in memory specificity, healthy OA have a preserved ability to retrieve memories at the specific level when they are highly self-relevant. Consistent with the 'positivity bias', Martinelli et al. (2013) also found that healthy OA produced more positive 'personal semantics' than AWA, and having a positive self-concept was associated with more positive 'self-defining' memories. In further support of the 'positivity bias', Ros and Latorre (2010) found that healthy OA retrieved fewer negative memories in response to negative cues than AWA. These findings support the idea that reduced memory specificity for negative events might be associated with better wellbeing, as suggested by Raes et al. (2006).

3.2. Is OGM a characteristic feature and relapse marker of depression in older adults?

3.2.1. Non-clinical samples

Serrano, Latorre, and Gatz (2007) found that OA with depression symptoms recalled more general memories than those without, but only for negative cues. There was no difference in specific memory recall. This indicates that OGM in OA with depression symptoms may be specific to negative memories, and occur due to increased generality rather than reduced specificty. The authors attribute this to rumination truncating the memory search at the general level. This is in line with findings that increased memory generality is associated with

distress (Raes et al., 2006). Although both groups showed a bias towards positive memories, those with depression symptoms retrieved significantly more negative memories, suggesting a less pronounced 'positivity bias'. Consistent with Serrano et al. (2007), Latorre et al. (2013) found that OA with both high and low depression symptoms recalled more positive than negative memories. Both groups were also slower to recall negative than positive memories. In contrast to Serrano et al. (2007), Latorre et al. (2013)'s high depression group produced fewer specific memories than the low depression group, with no signficant difference in general memory retrieval, indicating OGM through reduced specificity rather than increased generality. Although no relationship was found between depression scores and OGM, higher life satisfaction was associated with higher memory specificity. The authors therefore proposed that high memory specificity may be protective against depression. For both studies, participants were not prompted during the AMT following general memory recall, which is significant as this is likely to have affected the number of specific memories reported, making comparisons with other studies problematic. It is well noted that the variance in application of the AMT has a negative impact on the understanding of general versus specific memory (Rubin and Wenzel, 2002).

To explore whether OGM is a 'state' or 'trait' marker for depression in OA, Haringsma, Spinhoven, Engels, and van der Leeden (2010) compared the AMT performance of OA with remitted depression symptoms to matched healthy OA. Participants were assessed pre and post a negative mood induction. No difference was found between groups in terms of memory specificity, and although the induction successfully induced a sad mood state, it did not influence OGM in either group. To establish whether OGM was predictive of depressive relapse, Haringsma et al. (2010) followed up their OA with remitted depression at 14-17 months. They found that baseline scores and responsiveness to mood induction on the AMT did not predict new depressive episodes or depression scores at follow-up. This suggests that OGM is not sensitive to current mood state in OA, nor does it act as a marker for depression or predict relapse in OA, as it does in working age adults (e.g. Brittlebank et al., 1993). Haringsma et al. (2010) propose that the effects of normal ageing on OGM may override the detrimental effect of past depression, resulting in no observable difference between never-depressed and remitted-depressed OA. It is worth noting, however, that the 'remitted depressed' group were not a clinical sample, and prior to participating they had received an intervention for depression symptoms that addressed rumination. Given the relationship

between OGM and rumination, this may have reduced OGM in Haringsma et al. (2010)'s sample.

In a study examining the 'reminiscence bump', Gidron and Alon (2007) used an adapted version of the AMT to cue for memories from different life periods. They found that specificity for memories from adolescence was negatively correlated with depression scores. OA who scored above cut-off for depression symptoms showed reduced specificity for childhood and adolescent memories compared to those below cut-off. This suggests that in depressed older adults OGM is greatest for the period of life associated with the 'reminiscence bump', where memory specficty is relatively greater in older adults (Piolino et al, 2006) is usually found to have positively-biased recall.

3.2.2. Clinical samples

Fromholt, Larsen, and Larsen (1995) compared OAs with first episode clinical depression, OA with dementia, and healthy controls, on a novel memory task. Participants were asked to talk freely for 15 minutes about *"events that have been important in your life"*. The number of memories, valence and level of detail was scored, along with distribution across the lifespan. OA with depression recalled fewer, less detailed memories than controls, and performed no better than OA with dementia, suggesting that depression can be as detrimental to autobiographical recall as organic cognitive impairment. The depression group also produced signficantly more memories from the recent past (during the episode of depression) and a larger proportion of negative memories for this time period than the other groups. The authors suggest that depression may make it more difficult to retrieve earlier memories due to rumination on recent negative events. Fromholt et al. (1995) followed up their group with first episode depression at 6 months to re-assess depression and performance on the free narrative memory task. Those who had recovered from their depressive episode still tended to recall more memories from the recent past, however there was no longer a bias towards negative memories. This supports 'state' rather than 'trait' theories of the effects of depression on memory, as the negativity bias was lost on recovery. However, there was no change in the detail of the memories retrieved between baseline and follow-up, indicating that remission did not improve memory specificity and OGM could potentially be a 'trait' marker of depression OA. However, the memory task administered in this study did not prompt for specific memories as in the AMT, therefore only limited conclusions can be made regarding OGM. Although interesting in terms of the effects of depressed mood on memory chronology

and valence, the use of free recall and memory 'detail' as the only measure of specificity makes these findings difficult to compare with studies employing the AMT.

Birch and Davidson (2007) looked at executive function in relation to OGM. OA with depression recalled fewer specific memories than controls, but there were no significant differences in general memory recall. This suggests that there is more pronounced OGM in depressed compared to non-depressed OA, due to reduced specificity. For both groups combined, a positive relationship was found between specific memories and working memory, and a negative relationship between general memories and working memory. However, neither age nor depression score was related to OGM. These findings support the significant role of executive functioning in OGM, over and above the influences of age and depression. Interestingly however, no difference was found between groups in terms of cognitive functioning: depressed OA recalled fewer specific memories than controls despite having preserved working memory. The authors therefore propose an added role of self-referrent rumination in depression that interrupts the memory search, although rumination was not explicitly measured. Ricarte et al. (2011) found that OA with depression recalled fewer specific memories and more general memories than controls. In contrast with Birch and Davidson (2007), this suggests that OGM occurs due to both reduced specificity *and* increased generality. OA with depression also showed greater OGM in response to negative than positive cues, potentially indicating a functional avoidance of specific negative memories. Finally, Ricarte et al. (2011) found that higher memory specificity was associated with increased life satisfaction and reduced hopelessness in their control group, suggesting that memory specificity could be protective against depression.

3.3. Are interventions targeted at memory specificity effective for treating depression in older adults?

In a study measuring memory specificity in the context of a medication trial, Gallassi, Di Sarro, Morreale, and Amore (2006) assigned OA with depression to receive one of two antidepressant therapies, and compared with matched controls. Participants were assessed for depression and cognitive performance at baseline and 6 months post-treatment. Measures included an autobiographical memory task in which participants were asked to recall memories from different life periods. Memories were scored for content and level of detail.

At baseline, OA with depression showed poorer performance on the autobiographical memory task and on working memory tasks. Following treatment, those in remission showed improvements in autobiographical memory and working memory. These findings suggest that depression in OA affects various aspects of memory, including autobiographical memory specificity, and that much of this impairment improves on remission from the depressed state. However, performance of the remitted participants remained signficantly worse than controls, suggesting residual autobiographical memory problems that might indicate a depressive 'trait'. It must be noted that OGM was not the primary focus of this trial, which looked at various cognitive factors. As such, the autobiographical memory task is briefly described and it is difficult to ascertain how this compares to other measures of OGM.

de Medeiros, Mosby, Hanley, Pedraza, and Brandt (2011) randomly assigned their community sample to either an autobiographical writing intervention, an oral reminiscence intervention, or an inactive control group. Paticipants were assessed pre and post-intervention and at 6 month follow-up using measures of autobiographical memory, depression and wellbeing. Compared to the control group, neither intervention led to significant improvements in recall for specific autobiographical incidents, memory detail, or depression score. However, while the interventions involved recalling autobiographical memories, they did not explicitly target memory specificity. Additonally, the authors note that their autobiographical memory tasks are usually used with people with cognitive impairment, therefore may not have been sensitive to change in a non-clinical sample (de Medeiros et al., 2011).

In a study using the AMT, Ramirez, Ortega, Chamorro, and Colmenero (2014) allocated their OA community sample to either a Life Review intervention focused on memory specificity, gratitude and forgiveness, or a placebo focused on general early life memories. Participants were assessed pre and post intervention and at 4 month follow-up using the AMT, measures of depression and wellbeing. A significant reduction in depression and an increase in life satisfaction and happiness was found following the Life Review intervention, but not in the placebo group. There was also a significant increase in specific memory retrieval in the intervention group, but not placebo group. This suggests that a Life review intervention explicitly focused on memory specificity can improve OGM and mood in OA. However, the gains found post-intervention were not maintained at follow-up. The authors also did not explicitly look at the relationship between change in depression score and change in OGM, therefore it cannot be inferred whether the increased memory specificity led to improvements

in mood. As the intervention targeted 'gratitude' and 'forgiveness' as well as memory specificity, it is not possible to separate which part was most helpful in depressive symptoms.

Goncalves, Albuquerque, and Paul (2009) allocated OA with depressive symptoms to either a Life Review intervention or inactive control group. Participants were assessed pre and post intervention using the AMT and measures of depression and life satisfaction. They found that both groups demonstrated an increase in specific and positive memories on the AMT, however this was only significant in the intervention group. There were also greater improvements in depression & life satisfaction scores in the intervention group. This supports the use of Life Review to increase memory specificity and improve depression symptoms. However, the conclusions that can be drawn are limited due to the lack of an active control and follow-up period. This study also employed a very small sample and does not report the demographics of the two groups separately. Further, only the data for significant findings are provided, so the magnitude of the differences between the Life Review and control groups is unclear.

The final two studies were conducted by the same research group. Serrano, Latorre, Gatz, and Montanes (2004) allocated OA with depression symptoms to a Life Review intervention or inactive control group. Participants were assessed pre and post intervention using the AMT, depression, hopelessness and life satisfaction measures. Consistent with Goncalves et al. (2009), a significant reduction in depression and hopelessness and an increase in life satisfaction was found following intervention, but not in the control group. A significant increase in specific memories was found in the intervention group, and Serrano et al. (2004) also looked at the relationship between changes in OGM and depression scores. They found that change in memory specificity was a significant predictor of post-intervention hopelessness and life-satisfaction (and nearly significant for depression), when controlling for baseline scores. Although the direction of the relationship cannot be concluded, this finding supports the relationship between improved memory specificty and improved mood. Serrano Selva et al. (2012) addressed methodological limitations of the group's earlier trial by employing a clinical sample, an active control of supportive therapy, and follow-ups at 6 weeks and 6 months. Participants randomised to receive the Life Review intervention did not improve any more than the control group in terms of depression score, hopelessness or life satisfaction. However, in the intervention group, there was an increase in specific memories and this was associated with improved depression scores. These changes were maintained at

follow-up. Those who produced more specific memories reported a more rapid reduction in depression scores, suggesting that increased memory specificity may be a mechanism for improvement in depression. Overall, the findings of Serrano and colleagues indicate that Life Review can successfully increase memory specificity and this is associated with improvements in mood and wellbeing.

4. Discussion

This review aimed to establish what is currently known about OGM in relation to depression in older adults, and to identify potential clinical and research implications. The findings from studies comparing healthy older adults and AWA suggest that, in the absence of depression, older adults may have increased OGM compared to AWA. At least part of this effect appears due to age-related declines in executive functioning, with both working memory (Ros et al., 2010) and 'updating' of the memory search (Holland et al., 2012) identified as possible mechanisms. This supports the role of reduced executive function capacity in OGM, as proposed by the CaR-FA-X model (Williams, 2006; Williams et al., 2007), and suggests this element of the model is especially relevant to older adults.

Executive function problems alone cannot account for the OGM effect in older adults, however, as there are findings that OGM occurs in the absence of working memory deficits (or depression; Ford et al., 2014) and that memory specificity to emotional cues is preserved in the presence of reduced working memory (Holland et al., 2012). To account for this, Ford et al. (2014) point to an age-related tendency to incorporate memories into a single life narrative, leading to overgeneral recall. The retrieval of specific memories that are emotionally-valenced (Holland et al., 2012) and self-referrent (Martinelli et al., 2013) appears relatively preserved in healthy older adults. Therefore, it may be that memories that are highly related to older adults' integrated self-concept are retrieved more automatically, overcoming age-related declines in executive function.

4.2. Older adults, depression and OGM

Studies comparing healthy older adults to those with depression symptoms suggest, with one exception (Haringsma et al., 2010), that depression is associated with increased OGM in

older adults, as it is in working age adults. However, the literature is equivocal as to whether this occurs due to increased memory generality (Serrano et al., 2007), reduced specificity (Birch & Davidson, 2007; Latorre et al., 2013), or a combination of both (Ricarte et al., 2011). In line with the association between OGM and depression, there is evidence that higher memory specificity is associated with increased well-being in older adults (Latorre et al., 2013; Ricarte et al., 2011) and may therefore be protective against depression.

The evidence from Birch and Davidson (2007) supports the importance of working memory suggested by the CaR-FA-X model, indicating that this has an effect on OGM that is independent of depression or age. However, increased OGM was found to occur in older adults with depression in the absence of working memory impairment (Birch & Davidson, 2007), suggesting that OGM in this population cannot be solely attributed to mood-related impairments in executive functioning. OGM appears most pronounced in response to negative memory cues (Ricarte et al., 2011; Serrano et al., 2007). In line with the CaR-FA-X model (Williams, 2006; Williams et al., 2007), it is likely that older adults with depression ruminate on negative self-referent information, disrupting specific memory retrieval.

In contrast to findings that OGM is a stable 'trait' marker for depression in working age adults (e.g. Brittlebank et al., 1993), in older adults OGM does not appear to remain stable on remission from depression, to respond to negative mood states, or predict depressive relapse (Haringsma et al., 2010). However, these factors have been investigated by only one study, which had notable limitations. By comparison, Fromholt et al. (1995) found that low levels of memory detail remained stable on remission from depression.

To understand the relationship between OGM and depression in older adults it is also important to consider other factors affecting autobiographical memory. For example, there is increasing evidence that the presence of a trauma history increases OGM (e.g. Ono, Devilly and Shum, 2016) and that the type of trauma history may also be significant. In a cross-sectional study of AWAs, Griffith et al (2016) identified that depressed people recall fewer specific memories if they have a trauma history and that this effect is specific to child physical abuse and not child sexual abuse. Further, differences have been found between older adult and AWA in episodic autobiographical memory research beyond the issue of memory specificity, for example older adults report greater memory vividness and emotional intensity than AWAs (Brigard et al, 2016). Beyond this, although episodic memory, and OGM in particular, is clearly important in depression, it is not the only aspect of memory

research related to well-being. For example, it is proposed that semantic autobiographical memories play a mediating role between episodic autobiographical memories and the self (Haslam, Haslam, Pugliese and Tonks, 2011). It has been found that older adults show enhanced recall of details for semantic compared to episodic autobiographical memories (Levine et al, 2002). Interestingly, compared to healthy AWAs, the emotional valence of semantic autobiographical memories is more closely associated with well-being than episodic autobiographical memories in healthy older adults (Rathbone, Holmes, Murphy and Ellis, 2015). Future research into OGM in depression in older adults therefore needs to investigate episodic autobiographical memories beyond specificity, but it also needs to understand the relative importance of OGM in relation to episodic versus semantic memory systems.

In terms of older adult memory phenomena, there is evidence to suggest that older adults with depression do not show the 'reminiscence bump' found in heathly aging (Rubin et al, 1986). Specificity of autobiographical memory for early adult life in depressed older adults is reduced (Gidron & Alon, 2007), whereas healthy older adults' autobiographical memory is more specific for events from early life (Piolino et al, 2006). It is well established that difficult experiences in childhood and adolescents are associated with childhood and adulthood depression (see Birmaher et al, 1996); it would thus be adaptive to have less specific recall of events for this life period when they are predominantly negative, in the same way that it would be adaptive to have more specific recall from this period when events are predominantly positive. Consistent with the CaR-FA-X model (Williams et al, 2007), this suggests that OGM acts as a method of avoiding specific memories from this time period to regulate emotions through the truncation of a bottom down memory search to avoid the activation of associated, specific negative autobiographical memories. The CaR-FA-X model might then provide an explanatory account for the presence and absence of the reminiscence bump in relation to the need to avoid specific autobiographical memories from a particular period or not. Conversely, older adults with depression instead appear to demonstrate a bias towards recalling more recent, negative events (Fromholt et al., 1995). It is difficult to interpret the findings in relation to the CaR-FA-X model as it is not known whether the reported memories in this study were specific or general. It may be that attenuated executive capacity in depressed older adults results in reduced capacity for functional avoidance of all negative memories, whether these be associated earlier life events or not. This raises the important possibility that OGM applies more strongly to earlier negative life events in depressed older adults. This is consistent with the observation that when depressed people are

experiencing negative automatic thoughts they are readily able to substantiate them with specific examples from recent life situations (Beck, 1979).

It is difficult to establish the presence or absence of the positivity effect in relation to OGM in healthy and depressed older adults, respectively, due to the inconsistencies in reporting the proportions of specific versus general memories cued by positively and negatively valenced cues and how a positivity effect would therefore be indexed. However, where commentary is possible, memories are retrieved more automatically in response to positive cues in healthy older adults (Holland et al, 2010) and fewer specific negative memories are recalled compared to AWA (Ros & Latorre, 2010) Both Serrano et al (2007) and Latorre et al (2013) found that OA with both high and low depression symptoms recalled more positive than negative memories. It remains unclear whether a positivity effect exists or not in relation to OGM. It is of theoretical and clinical importance for future research to consider the presence or absence of a positivity effect in relation to OGM in healthy and depressed older.

5. Clinical implications

Studies of Life Review interventions support the use of this approach for improving memory specificity, depression symptoms and wellbeing in older adults. However, the only adequately controlled trial in a clinical sample (Serrano Selva et al., 2012) did not find any significant benefit of Life Review over supportive therapy. However, consistent with Goncalves et al (2009) and Serrano et al (2004) there was a positive relationship between specific memories and improvement in depression scores in the intervention group. This limited evidence suggests that increasing memory specificity may be one mechanism through which depression can be improved in this client group. This interpretation is, however, complicated by the finding that autobiographical memory improves on remission of depression through antidepressant treatment (Gallassi et al., 2006), which suggests that OGM may improve as a consequence of reduced depressive symptoms, rather than improvements in OGM leading to reductions in depression. Nonetheless the finding that greater specificity is related to reductions in depressive symptoms is consistent with memory specificity interventions in the AWA literature (Dalgleish et al., 2013; Neshat-Doost et al., 2013; Raes et al, 2009). These techniques differ from life review in a number of ways. They promote identification of specific memories from valence cues (compared to life stages or events in Life Review intervention) and they also seek to elaborate these to be highly accessible, and specific multi-sensory memories, drawing on core memory research such as the Method of Loci and levels of processing (Craik and Lockhart, 1972). Such adaptations could be adopted into Life Review interventions to investigate whether this improves memory specificity in older adults. Regardless of intervention type, it would be of theoretical importance to

investigate the period of life that pre-post memory specificity relates to the 'reminiscence bump' and whether improved access to specific memories from this period is related to well-being.

6. Implications for research

In terms of methodological issues, researchers looking at OGM in older adults need to adopt standardised procedures for administering the AMT to allow comparison between studies. This would also faciliate future systematic and meta-analytic review. When isolating the relationship between depression and OGM, it is important to ensure that other problems that might influence OGM (e.g. cognitive impairment, PTSD and antidepressant medications) are adequately screened and controlled for.

It was notable that few of the reviewed papers (Ford et al., 2014; Ricarte et al., 2011; Ros et al., 2010) cited the CaR-FA-X model, despite the dominance of this theoretical framework in the wider OGM literature. Research is needed to look more explicitly at different factors of the CaR-FA-X model in this client group, especially rumination and functional avoidance, but also executive functioning. There is a substantial line of research into rumination and repetitive thinking (see Watkins, 2008), which has ledto the development of interventions such as Rumination-focused Cognitive Behavioural Therapy (RF-CBT; Watkins et al., 2011). Establishing the relationship between rumination and OGM in older adults would enable more joined-up thinking around clinical approaches. Further longitudinal research would also be beneficial in order to establish whether OGM is a stable 'trait' marker of depression in older adults, and whether OGM can predict depressive relapse in this group.

Finally, there is a need for further clinical trials to help draw firmer conclusions regarding the efficacy and mechanisms of action of Life Review interventions. Ideally, trials are needed on a larger scale and with more in-depth analysis of mediating factors. In progressing this research, it would seem beneficial to draw on the literature on memory specificity interventions being developed in the wider research. Although the two lines of research have evolved separately, they have converged on similar conclusions around the potential benefits of increasing memory specificity as an intervention for depression.

7. Limitations

The inclusion criteria for this review were kept broad to be as inclusive as possible. As a result, there was heterogeneity in the studies reviewed in terms of the methodology, quality and samples. Although the literature searches were conducted using a systematic procedure, the current review does not claim to be exhaustive, for example it did not include a search of the grey literature. The definition of the 'older adult' population as 50 years and over is potentially amlimitation as 65 years and over is commonly used in research and for eligibility to services. There are, however, a number of precedents in the literature of systematic reviews defining older adults as 50+ (e.g. Colcombe and Kramer, 2003; Kueider, Parisi, Gross and Rebok, 2012). The review would also have been enhanced by utilising inter-rater checks at the article selection and data extraction stages as well as using a recognised tool to assess the quality of the included articles.

8. Summary

Clear evidence was found that OGM occurs in older adults in the absence of depression, due partly to changes in executive functioning associated with healthy aging. There is also suggestion that OGM in healthy older adults reflects a tendency to integrate memories in terms of self-relevance and a bias against retrieval of specific negative memories. In this respect, OGM in older adults could be considered beneficial to wellbeing in some circumstances, rather than a marker of emotional distress. However, in line with the literature in AWA, there was strong evidence that the presence of depression in older adults increases OGM. This appears due in part to the effects of depressed mood on executive functioning, as well as possible changes in the relationship individuals with depression have to negative memories. However, the role of rumination and functional avoidance mechanisms in OGM in older adults has not been adequately investigated. It is also unclear to what extent OGM acts as a marker for recurrent depression in older adults and further research is needed. In terms of clinical implications, there is some support for the use of Life Review interventions for increasing memory specificity and improving depression symptoms.

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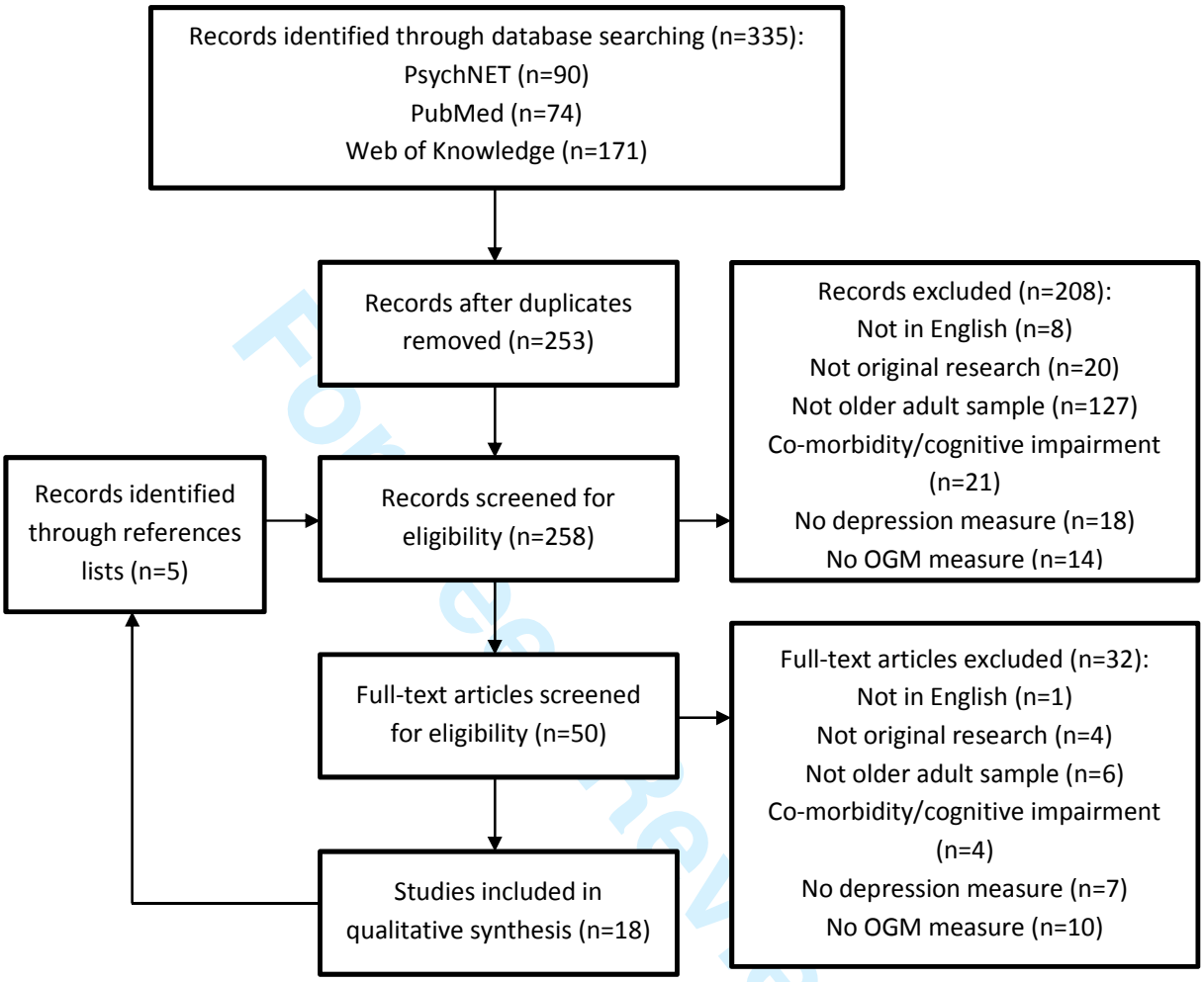

Figure 1: PRISMA Flow Diagram of article identification process

Table 1

Study	Location	Sample	Gender	Ages	Depression Measure	OGM Measure	Other Measures
Differences in OGM between older adults and AWA in the absence of depression							
Ford, Rubin, and Giovanello (2014)	USA	1. AWA (N=25) 2. OA (N=21), within subjects	1. 10 male, 15 female 2. 10 male, 11 female	1. M= 18.7, SD= 0.76, 2. M= 75.6, SD= 5.97	Beck Depression Inventory (BDI): Used to check group equivalence	Novel musical cue task	Executive function tasks: Stroop, N-back, Number-Letter switching
Holland, Ridout, Walford, and Geraghty (2012)	UK	1. AWA (N=25) 2. OA (N=21)	Not available	1. 18-35, M=21.6, SD= 4.65 2. 55-87, M=69.52, SD= 10.52	Hospital Anxiety and Depression Scale (HADS): Used to compare groups and controlled for in analyses	AMT	Random Number Generation (measures of inhibition and updating)
Martinelli, Anssens, Sperduti, and Piolino (2013)	France	1. AWA (N=18) 2. OA (N=16) 3. OA with dementia (N=10	1. 8 male, 10 female 2. 6 male, 10 female 3. 1 male, 9 female	1. M= 22.16, SD= 1.92 2. M= 75.18, SD= 4.61 3. M= 76.30, SD= 4.01	BDI: Used to exclude if score 14+, and entered as covariate in analyses.	Word cued recall of 'autobiographical episodes', 'personal semantics' and 'self-defining memories'	Tennessee Self-Concept Scale
Ros and Latorre (2010)	Spain	1. AWA (N=50)	1. 21 male, 29 female	1. 23-30, M=26.59, SD=2.07	Center for Epidemiological Studies-	AMT (valence only reported)	None

		2. OA (N=46)	2. 11 male, 35 female	2. 57-80, M=65.98, SD= 5.54	Depression scale (CES-D): Used as covariate in analyses		
Ros, Latorre, and Serrano (2010)	Spain	As above	As above	As above	As above	AMT	Measures of Working Memory, Short Term Memory and Sustained Attention
OGM as a characteristic feature and relapse marker of depression in older adults							
Gidron and Alon (2007)	Israel	OA (N=25)	12 male, 13 female	65-89, M=77.92, SD=6.5	Geriatric Depression Scale-15 items (GDS-15): Cut-off 7 for inclusion	AMT, adapted to cue for life periods	None
Haringsma, Spinhoven, Engels, and van der Leeden (2010)	Holland	1. OA with remitted depression (N=63) 2. OA with no history of depression (N=60) T1. Baseline T2. Post mood-induction.	1. 15 male, 48 female, 2. 13 male, 47 female	1. 55-86, M=64.92, SD=6.84 2. 55-86, M=64.47, SD=6.65	MINI diagnostic interview CES-D	AMT	Visual Analogue Mood Scale

Latorre et al. (2013)	Spain	1. OA with high depression symptoms (N= 33) 2. OA with low depression symptoms (N= 33)	1. 14 male, 19 female 2. 12 male, 21 female	1. M= 72.09, SD= 7.88 2. M= 72.52, SD= 5.61	CIDI diagnostic interview CES-D : Cut-off 16 for group allocation	AMT	Life Satisfaction Index
Serrano, Latorre, and Gatz (2007)	Spain	1. OA with depression symptoms (N=95) 2. OA without depression symptoms (N=90)	77 male, 108 female	60+, M= 72.21, SD= 7.56	CES-D: Cut-off 16 for group allocation)	AMT	None
Birch and Davidson (2007)	UK	1. OA with depression (N=17) 2. OA without depression (N=17)	1. 4 male, 13 female 2. 6 male, 11 female	1. 65+, M=71.5, SD=4.7 2. 65+, M=73.9, SD= 5.1	GDS-30: Cut off 14	AMT	Wechsler Memory Scale III, Working Memory Index, Mini Mental State Exam (MMSE), Wechsler Test of Adult Reading
Fromholt, Larsen, and Larsen (1995)	Denmark	1. OA with first episode depression (N=15) 2. OA with dementia (N=30)	1. 2 male, 13 female 2. 5 male, 25 female	1. 72-90, M= 80.2, SD= 5.27 2. 73-89, M= 80.5, SD= 4.36	Clinical diagnosis according to DSM-III	Free recall narrative on "events that have been important in your life"	Brief Cognitive Rating Scale: Used to check for cognitive decline in depression group

		3. Healthy OA (N=30)	3. 12 male, 18 female	3. 71-89, M=78.3, SD= 4.81			
Ricarte et al. (2011)	Spain	1. OA with depression (N=34) 2. OA without depression (N=34)	1. 5 male, 29 female 2. 7 male, 27 female	1. 65+, M= 74.59, SD=5.48 2. 65+, M=75.09, SD=7.56	MINI diagnostic interview	AMT	Life Satisfaction Index, Beck Hopelessness Scale
Interventions targeted at increasing memory specificity in depressed older adults							
de Medeiros, Mosby, Hanley, Pedraza, and Brandt (2011)	USA	OA (non-clinical) 1. Autobiographical Writing Group (N=18) 2. Oral Reminiscence Group (N=18) 3. Control Group (N=15) T1. Baseline T2. Post-intervention T3. 26 week follow-up.	1. 7 male, 11 female 2. 6 male, 12 female 3. 7 male, 8 female	1. 67-88, M79.6, SD=6.1 2. 71-96, M=81.5, SD=5.9 3. 73-87, M=81.1, SD=4.0	GDS-15	Autobiographical Memory Interview ('autobiographical incidents') Remote Memory Word Association Task ('episodic specificity')	Hopkins Verbal Learning Test, Brief Visuo-spatial Memory Test, Short Form-36, NEO Five-Factor Inventory, Tennessee Self-Concept Scale
Gallassi, Di Sarro, Morreale, and Amore (2006)	Italy	1. OA with depression (N=48), assigned to either a. Fluoxetine (N=24) b.Reboxetine (N=24) 2. Matched Healthy	1. 12 male, 36 female 2. 6 male,	1. 50+, M=67.54, SD=8.08 2. 50+, M=69.33,	Clinical Diagnosis Hamilton Rating Scale GDS-30	Autobiographical Memory interview (content and detail of memories)	WMS, Familial/Famous Face Recognition, Attentional Matrices, Stem Completion, MLT '88 test for

		OA (N=15). T1. Baseline T2. 6m of treatment	9 female.	SD=5.49			Historic Events.
Goncalves, Albuquerque, and Paul (2009)	Portugal	OA with depression symptoms 1. Life Review Intervention Group (N=11) 2. Control Group (N=11) T1. Baseline T2. Post-intervention	22 female	65+, M=80.7, SD= 4.5	GDS-15: Cut-off 4 for study inclusion	AMT	Life Satisfaction Index
Ramirez, Ortega, Chamorro, and Colmenero (2014)	Spain	OA 1. Life Review Intervention Group (N=26) 2. Placebo Group (N=20) T1. Baseline T2. Post-intervention T3. 4m follow-up.	1. 10 male, 16 female 2. 7 male, 13 female	60-93, M=71.18, SD= 7.06	BDI	AMT	State and Trait Anxiety Inventory, Life Satisfaction Scale, Subjective Happiness Scale

Serrano, Latorre, Gatz, and Montanes (2004)	Spain	OA with depression symptoms 1. Life Review Intervention Group (N=20) 2. Control Group (N=23) T1. Baseline T2. Post-intervention	10 male, 33 female	65-93, M=77.19, SD=7.68	CIDI diagnostic interview for caseness CES-D for inclusion: Cut-off 16	AMT	Life Satisfaction Index, Beck Hopelessness Scale
Serrano Selva et al. (2012)	Spain	OA with depression 1. Life Review Intervention Group (N= 18) 2. Placebo Group (N=19) T1. Baseline T2. Post-intervention T3. 6 week follow-up T4. 6m follow-up.	6 male, 31 female	64-83, M=73.9	MINI diagnostic interview GDS-30	AMT	Beck Hopelessness Scale, Life Satisfaction Index, Quality of Life in Depression Scale