"I thoroughly enjoyed *The Preservation of Memory*.
The central question of how we can preserve memory function
as we age and/or develop cognitive impairment is one of central
importance to a range of researchers, clinicians and individuals.
The broad coverage of a range of topics provides a unique
multi-faceted perspective, making the book relevant
and accessible to a wide-ranging readership."

Stefan Teipel, *Department of Psychosomatic Medicine, University of Rostock, and DZNE Rostock, Germany*

increase in average life expectancy has given rise to a number of ›ssing health challenges for the 21st century. Age-related memory s, whether due to a neurodegenerative condition such as Alzheimer's ease, or as a product of the normal process of ageing, is perhaps most significant of the health problems of old age presently nfronting our society. *The Preservation of Memory* explores non-asive, empirically sound strategies that can be implemented to sure long-lasting and effective retention of information.

The chapters in this volume describe and evaluate both well-established and novel methods for improving and strengthening memory for people with and without dementia. They also look at ways in which effective detection and care can be implemented and describe empirical findings that can be translated into everyday practice. The contributors take a multidisciplinary approach, motivated by the desire to look beyond and oss boundaries to find new areas of knowledge and opportunities future research.

e *Preservation of Memory* will be useful reading for students and earchers focusing upon memory, ageing and dementia, and also for ntal health practitioners, social workers and carers of persons living h dementia or other memory impairments.

vide Bruno is Senior Lecturer in Psychology Liverpool Hope University, UK.

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MEMORY TRAINING FOR OLDER ADULTS

A review with recommendations for clinicians

Robin L. West and Carla M. Strickland-Hughes

10.1 Introduction

Cognitive training programs for older adults span a very wide range of research, from case studies with people with dementia to extensive individual practice of specific information processing skills, and from comprehensive group training programs for healthy seniors to broad approaches that increase cognitive engagement. A primary target of these cognitive interventions is memory improvement. Improved memory is a key aim for several reasons. Foremost, as an integral process involved in everyday experience, memory capacity may affect older individuals' ability to live independently (Fisher, 2012; Montegjo, Montenegro, Fernández, & Maestú, 2012; Stine-Morrow & Basak, 2011). Older adults themselves recognize the importance of memory, and have fears concerning memory loss (Dark-Freudeman, West, & Viverito, 2006). In part, these fears are realistic because cross-sectional and longitudinal studies report age-related declines in working memory, learning of new associations (see Chapter 3), and encoding of new long-term memories (Mather, 2010; McDaniel, Einstein, & Jacoby, 2008). Thus, memory is emphasized in training because it is essential, valued, and at risk for decline.

Our purpose in this chapter is to first review the literature on memory training, focusing on healthy seniors with no significant memory impairment. We consider memory training outcomes as well as maintenance of training gains over time. Although it is very clear that physical activity has cognitive benefits, Chapter 9 in this volume provides an overview of that work. Here we focus on mental activities and behavioral programs that foster memory success. Following the literature overview, we make practical, research-based recommendations for scholars and clinicians with respect to those methods and approaches to training that are most likely to yield success.

10.2 Memory training outcomes

10.2.1 *Improved memory performance*

A long-accepted body of work establishes that older adults benefit from memory training when comparing memory performance following an intervention to performance on a pretest (Berry, Hastings, West, Lee, & Cavanaugh, 2010; Gross et al., 2012). At the same time, well-documented practice effects suggest that memory improvement will occur simply from retaking memory assessments (Ball et al., 2002; Hertzog, Kramer, Wilson, & Lindenberger, 2009). Therefore, this review focuses only on those intervention studies that compare pretest to posttest gains of trainees to control groups, who do not participate in the memory training. Control groups may be inactive/wait-list participants (completing assessments and nothing else) or active groups (participating in different activities, matched to the intervention by frequency, duration, social engagement, etc.) designed to act as placebo controls (Boot, Simons, Stothart, & Stutts, 2013; Zehnder, Martin, Altgassen, & Clare, 2009).

Meta-analyses have confirmed greater pretest to posttest gains for older memory trainees compared to active and inactive control groups. Training gains are greater for interventions that incorporate pretraining, such as relaxation or attention exercises, and gains are greater for group training compared to programs training adults individually (Verhaeghen, Marcoen, & Goossens, 1992). These earlier findings were replicated more recently, showing significant differences in pretest to posttest memory gains for trainees versus controls (estimated effect size was 0.31 standard deviations). Training gains were not affected by age of participant or specific trained strategy, although programs employing multiple strategies were more effective than those focused on training a single strategy (Gross et al., 2012).

Three experimental studies will be highlighted here as examples of memory intervention: the Advanced Cognitive Training for Independent and Vital Elderly (ACTIVE) trial, the Everyday Memory Clinic (EMC), and a theater arts program. The first study, ACTIVE, represents a randomized clinical trial conducted with older adults ($N = 2{,}832$) in six different U.S. cities. Posttest outcomes were assessed immediately as well as repeatedly over time. Participants were assigned to training in memory, reasoning, or speed of processing, with each training program serving as an active control for the other types of training. The focus of the memory training was verbal episodic memory (e.g., list or story recall); trainees completed 10 weekly sessions of 60–75 minutes of learning (first five sessions) and then practicing (last five sessions) strategies, such as association and imagery. More than a quarter of memory trainees demonstrated reliable improvement in verbal episodic memory immediately following the intervention, and memory trainees outperformed the other groups on the verbal memory tasks one and two years later (Ball et al., 2002). Plus, verbatim recall of stories was higher for memory versus non-memory trainees immediately following training (Sisco, Marsiske, Gross, & Rebok, 2013).

The second study of note is EMC, a five-week multifactorial intervention emphasizing self-regulatory beliefs. Adults over 50 learned and practiced five strategies in weekly group meetings with extensive homework (West, Bagwell, & Dark-Freudeman, 2008) or learned the same strategies in a self-help format (Hastings & West, 2009). EMC was designed to enhance memory self-efficacy (confidence in one's memory ability) through enactive mastery (e.g., trainees focused on easier strategies and tasks first), vicarious experience (e.g., strategy modeling), verbal persuasion (e.g., positively framed feedback), and anxiety reduction (e.g., emphasis on self-set goals rather than high memory scores). Compared to controls, EMC trainees demonstrated improved name and story recall, and more effective strategy usage after training and at follow-up testing (West et al., 2008). Active trainees, classified by attendance, homework completion, and in-class participation, demonstrated greater training gains than both inactive trainees and the control group (Bagwell & West, 2008).

Several innovative approaches have evaluated the potential memory benefits of cognitive activity from programs emphasizing naturalistic, community-based engagement (Carlson et al., 2008; 2009; Stine-Morrow et al., 2014; see also Chapter 11). For example, Noice and colleagues designed a program to improve memory in the context of a four-week theater arts program. Episodic memory gains for older adult trainees exceeded that of inactive control groups and groups trained in other arts programs (i.e., visual arts or singing; Noice & Noice, 2006; 2009; 2013; Noice, Noice, & Staines, 2004). The program demonstrated gains in samples of independently living older adults (Noice et al., 2004), residents of long-term care facilities (Noice & Noice, 2006), and less affluent adults residing in subsidized, low-income, retirement homes (Noice & Noice, 2009). Importantly, Noice and Noice (2013) replicated memory gains even when training was administered by others (a retirement home activity director and a professional acting teacher), demonstrating widespread feasibility of this particular approach to intervention.

10.2.2 Transfer and practical impact

10.2.2.1 Broader gains from training

Researchers agree that intervention programs lead to memory gains on the trained tasks. But training can be far more beneficial if it also leads to broader cognitive change, active lifestyles, and improved well-being (Hertzog et al., 2009; Stine-Morrow & Basak, 2011). One criticism of cognitive interventions for older adults is the "generalist assumption" that researchers may assume far-reaching benefits from specific training, when the observed benefits are actually rather narrow (McDaniel & Bugg, 2012; Salthouse, 2006). It is true that there is little evidence that memory training on one set of tasks generalizes to other kinds of memory or to real-world memory gains, but there is some evidence of transfer across fairly similar memory tasks (Berry et al., 2010). Further, there are indications that training does transfer to other important outcomes.

For example, older adults, compared to younger adults, are less likely to spontaneously or successfully employ mnemonics (McDaniel & Bugg, 2012). Yet, ACTIVE study trainees improved in their use of memory strategies immediately following training, and these gains were maintained over five years and were closely related to memory ability (Gross & Rebok, 2011). Additionally, participation in the ACTIVE trial predicted improved activities of daily living after five years, although these effects were not evident immediately following training (Rebok et al., 2014; Willis et al., 2006). With increased evidence of plasticity, even in late life, engaged lifestyles and participation in cognitive interventions may promote neurogenesis (Park & Bischof, 2013). Indeed, increased neural activation during cognitive tasks was found in a subsample of participants from the Experience Corps study, a community-based program in which older adults volunteered in literacy projects in elementary schools (Carlson et al., 2009). Other memory training programs have demonstrated reductions in depression and loneliness (Cohen-Mansfield et al., 2014), and depression is a known risk-factor for dementia (Ownby, Crocco, Acevedo, Vineeth, & Loewenstein, 2006; Pomara et al., 2012). In addition, self-evaluative change is an important non-trained outcome for cognitive interventions.

10.2.2.2 Change in self-evaluative beliefs

In the broad sense, self-evaluative beliefs relate positively to quality of life (Montegjo et al., 2012), relate negatively to depression (Floyd & Scogin, 1997), and predict mortality in late life (Wiest, Schüz, & Wurm, 2013). More specifically, memory beliefs correlate positively with memory performance (Beaudoin & Desrichard, 2011; Crumley, Stetler, & Horhota, 2014; Valentijn et al., 2006). Theoretically, positive self-evaluative beliefs should foster greater engagement in cognitively stimulating activities (Bandura, 1997), which would certainly have important practical consequences, given the association between cognitive activity and performance (Hertzog et al., 2009).

Some time ago, a meta-analysis by Floyd and Scogin (1997) revealed a small but significant effect ($d = .19$) of memory training on subjective memory; that is, assessments of own memory functioning. Further, gains in subjective memory seemed to be enhanced by pretraining and interventions focused on changing attitudes. Across subsequent literature, training sometimes led to improved memory self-ratings without changing performance on most trained tasks, or evidence showed improved performance without change in beliefs (cf. Rapp, Brenes, & Marsh, 2002; Valentijn et al., 2005; Woolverton, Scogin, Shackelford, Black, & Duke, 2001). Three recent studies illustrate a strong relationship between self-evaluation and training.

The EMC intervention yielded significant changes in memory self-efficacy (MSE) and control beliefs for memory (believing that improvement can derive from one's own efforts). In contrast, the wait-list control group demonstrated modest *declines* in beliefs (West et al., 2008). MSE was a significant predictor of episodic memory performance at follow-up, and change in MSE was a direct predictor of training gains (West & Hastings, 2011). The ACTIVE study also assessed beliefs. Five years following the ACTIVE intervention, the memory trainees were less likely than other groups to report significant declines in the *chance* control scale (i.e., believing that your performance outcomes are driven by chance; Wolinsky et al., 2009). Finally, Cohen-Mansfield and colleagues (2014) compared three different interventions offered to older adults with subjective memory complaints: health promotion classes, ACTIVE memory training, and a participation/book club on strategies. All groups showed improved performance, but only the memory group improved in reported memory complaints.

10.2.2.3 Transfer to cognitive outcomes

Results from cognitive training via computer or video games show promise for cognitive transfer (Kueider, Parisi, Gross, & Rebok, 2012). Video games elicit extended practice of core processes such as working memory, visual attention, and speed of processing (Hertzog et al., 2009). In a meta-analysis comparing pretest to posttest gains for older adults trained with video games to performance of control groups, video-game training enhanced memory, reaction time, attention, and general cognition (Toril, Reales, & Ballesteros, 2014). Core skill training (e.g., working memory practice) has led to transfer to other types of cognition, but rarely to other types of memory (Morrison & Chein, 2011).

Transfer or generalization of training has been explored for decades, with limited transfer shown to occur between different types of memory tasks. However, it is likely that more positive evidence for transfer would be observed if interventions were designed with conceptual models for transfer in mind (Barnett & Ceci, 2002; Hering, Rendell, Rose, Schnitzspahn, & Kliegel, 2014; Zelinski, 2009). Clearly, when looking at transfer of training, it is valuable to consider benefits that extend beyond memory per se to broader abilities, beliefs, and neurological and mental health outcomes. In turn, these outcomes may promote a positively engaged, healthy cognitive lifestyle and potential maintenance of gains.

10.2.3 Long-term maintenance

Memory interventions with older people demonstrate promise for maximizing memory and promoting positive self-evaluative beliefs. Although evidence on long-term maintenance is lacking, follow-ups have been conducted at one month (West et al., 2008), one year (Ball et al., 2002), two years (Bottiroli, Cavallini, & Vecchi, 2008), and three years (Scogin & Bienas, 1988; Stigsdotter-Neely & Bäckman, 1993) after initial training, with mixed results. The majority of intervention studies examine gains cross-sectionally and do not offer extensive evaluation of outcomes over time, particularly more than one year later (Gross et al., 2012). Consequently, little is known about long-term maintenance of benefits from memory training.

The ACTIVE trial was the first memory program to assess long-term outcomes, up to 10 years after training (Rebok et al., 2014). A subset of memory trainees completed four booster sessions (follow-up training intended to promote maintenance of gains) about one year after initial training. Analyses of these long-term data showed that memory trainees demonstrated improved memory, relative to active

controls, up to five years following the study (Willis et al., 2006). Interestingly, this gain was unaffected by participation in booster sessions (Rebok et al., 2013), and no memory training or booster effects were significant 10 years following the program (Rebok et al., 2014).

Hertzog and colleagues (2009) have proposed that cognitive interventions are unlikely to function like vaccines, protecting against decline and potentially requiring periodic boosters, but rather like a physical activity intervention, wherein continuing exercise is necessary for maintenance of performance gains. While the data on ACTIVE maintenance is hopeful, that evidence cannot confirm Hertzog's proposition regarding the benefits of training. Cognitive interventions may indeed yield meaningful long-term benefits to the extent they improve related outcomes, such as enhanced self-evaluative beliefs, neurogenesis, or elevated cognitive engagement in everyday life, but this awaits further longitudinal research.

10.3 Recommended approaches to training

As a practical matter, there are countless ways that memory training can be done. Six decades of research on training for older adults, however, indicates that particular approaches are likely to be most effective. The two most important questions are *what* and *how* to train. The following recommendations derive from a "best practices" review of training (West, 2010), as well as discussions at a recent cognitive training workshop (American Institute for Research, 2014).

10.3.1 Metamemory

Metamemory represents a person's knowledge about memory, including knowledge about how memory works and knowledge about one's own memory skill (Hertzog & Hultsch, 2000). In working with older adults, it is extremely useful to present knowledge about how memory works, and, in particular, explanations about the aging process and memory (Troyer, 2001). Older adults have many memory fears (Dark-Freudeman et al., 2006; Hertzog et al., 2009), and just providing information about normal age-related declines may relieve stress in older adults who may worry excessively about dementia, or ruminate over each memory failure (Hess, Auman, Colcombe, & Rahhal, 2003; Valentijn et al., 2005; Welch & West, 1995).

Research has also suggested that training in monitoring skills can be beneficial (Dunlosky, Kubat-Silman, & Hertzog, 2003). For example, if a person knows that a name or a password has been sufficiently studied, then he/she can cease strategic encoding effort without problematic consequences. Dunlosky and Hertzog have developed a paradigm for training of monitoring skills (Hertzog & Dunlosky, 2012) and demonstrated its effectiveness in at-home as well as in-laboratory settings (Bailey, Dunlosky, & Hertzog, 2010). Their research suggests that, once trained for a particular memory task, self-monitoring can sometimes be transferred to other memory tasks (Cavallini, Dunlosky, Bottiroli, Hertzog, & Vecchi, 2010). If true, this will be an important approach to use in future training studies.

10.3.2 *Self-evaluative beliefs*

It is not surprising that there has been considerable interest in self-evaluation in the training literature (West, Welch, & Yassuda, 2000), as age differences in beliefs about one's own memory are a prevalent finding in aging research (Berry et al., 2010), and the relationship between beliefs and performance increases with age (Blanchard-Fields, Horhota, & Mienaltowski, 2008). Attempts to alter memory self-evaluation have been part of memory training research for decades, but, until recently, the research showed modest success, as noted above. Recent evidence from experimental studies demonstrates that self-evaluative beliefs might not only be changed by memory training, but may actually regulate performance benefits from training, through moderation and mediational processes (Miller & Lachman, 1999; Payne et al., 2012; West & Hastings, 2011).

Methodological factors may explain variations across studies. Some researchers have assessed individuals' confidence in their current capacity ("I can recall names"), using measures such as the Metamemory in Adulthood (MIA) capacity subscale (Dixon, Hultsch, & Hertzog, 1988) or the Memory Self-Efficacy Questionnaire-4 (West, Thorn, & Bagwell, 2003). Others have emphasized more general assessments of beliefs ("My memory is not very good"; "My memory is worse than it used to be"). While training gains may encourage people to feel more confident about improvement on specific tasks, training may not change older adults' opinions that their memory has declined from youth or that their memory could still benefit from more training. Thus, questionnaires that tap into more specific capacity or ability ratings are more likely to show change as a function of training than general memory ratings.

Looking only at more specific capacity measures, past research shows that MSE predicts current (Stine-Morrow, Shake, Miles, & Noh, 2006) as well as future performance (Valentijn et al., 2006), and is related to the motivational gains observed when participants are given memory goals or feedback (Strickland-Hughes, West, Smith, & Ebner, under review; West, Ebner, & Hastings, 2013). As noted earlier, MSE predicted memory gains in the EMC study (West & Hastings, 2011). Additionally, trainees with higher initial levels of MSE allocated more time to training and benefited more from an inductive reasoning intervention (Payne et al., 2012).

Considering the collective evidence, self-evaluative beliefs can be viewed as important antecedents and consequences of cognitive intervention. Thus, measures of MSE or current capacity (using the MIA) are recommended for investigators interested in assessing memory self-ratings. Assessments of self-reported memory are also useful for clinicians looking at the impact of clinical programs. In the absence of change in self-rated performance following training, it is likely that trainees will not be sufficiently motivated to continue the considerable effort that maintenance of training gains may require.

10.3.3 *Strategies and practice*

Most training programs for older adults do not focus on self-monitoring or self-evaluative beliefs. They focus on strategy training, and the strategies that are most often taught are encoding techniques, specifically association, categorical organization, imagery, and methods specific to text or number recall (see Derwinger, Stigsdotter, MacDonald, & Bäckman, 2005; Gross et al., 2012; Meyer & Poon, 2004; West, 1995; West et al., 2008).

One issue often debated is whether training should focus on unfamiliar or familiar strategies. For example, organization is a strategy that older adults generally know (e.g., how to organize a shopping list into meats, beverages, dairy products, etc.). Working on this familiar strategy then focuses trainees on extensive practice, so that they can organize items quickly and effectively. An alternative methodology is to enhance the ability of older adults to use techniques that they rarely use in everyday life. Mental imagery would be an example of that kind of strategy (Verhaeghen & Marcoen, 1996; West, 1995; West et al., 2008). Interestingly, there is some suggestion that the benefits may be similar for learning new strategies and practicing known techniques (Bailey et al., 2010). In a more extensive training program, instructors might want to first emphasize well-known strategies to promote positive motivation in trainees and later move on to less familiar, more complex strategies (West et al., 2008).

It is often assumed that training-related gains occur because trainees are using the newly learned strategies, but this assumption is rarely tested due to the difficulty in implementing think-aloud procedures and in assessing internal cognitive processes directly (West et al., 2000). Most of the data we have on strategy use comes either from objective assessments of clustering or subjective self-reports of strategy use. For example, strategy use in the EMC was assessed using detailed checklists. Although trainees employed more strategies than controls at posttest, detailed analyses revealed that they used the simpler techniques or focused only on the easier components of the more complex methods practiced in training (West et al., 2008). Thus, trainees likely use only some of what they have been taught. However, they probably also benefit from general changes in information processing, such as paying greater attention, and being more motivated to concentrate on to-be-remembered items after training.

Many laboratories are now focused on training specific subcomponents of memory through repeated practice (Borella, Carretti, Riboldi, & de Beni, 2010; Jaeggi, Buschkuehl, Shah, & Jonides, 2014; Karbach & Verhaeghen, 2014; Morrison & Chein, 2011; see also Chapter 4), in tasks such as visual attention or working memory. This is also the approach commonly used in commercial software (see Shipstead, Redick, & Engle, 2012; Zelinksi et al., 2011). It has been clear for decades that older adults show plasticity and perform better on those skills that are explicitly trained (Cohen-Mansfield et al., 2014; Verhaeghen, 2000; West, 1995), and we can confidently say that untrained control groups show significant improvements from repeated practice with memory assessments (Ball et al., 2002; Gross et al., 2012; Hertzog et al., 2009). At the same time, it is not clear that repeated practice of component subskills can provide significant general benefits for memory in the laboratory or in daily life (Buschkuehl et al., 2008; Dahlin, Stigsdotter-Neely, Larsson, Bäckman, & Nyberg, 2008; Harrison et al., 2013). Nevertheless, these programs have built-in motivational mechanisms that are valuable (e.g., providing positively framed feedback, showing that the person's "memory age" is getting younger as they improve, or raising the difficulty level gradually to ensure that the tasks remain challenging over time) because they encourage trainees to continue to engage in effortful cognitive activity (Hertzog et al., 2009). However, the benefits of core skill practice for improving episodic memory remain unclear.

Overall, then, training of strategies (one or many; familiar or novel) and extended practice may be beneficial. Training multiple, rather than single, strategies may be more effective in improving memory performance, but no single strategy seems more effective than others (Gross et al., 2012). Therefore, to increase training impact, we recommend selecting strategies most relevant to the desired outcome and offering instructions in more than one technique. To understand and maximize practical impact, scholars should continue to evaluate how strategies are actually being utilized in everyday life.

10.3.4 Social effects in training

Should training programs for seniors be designed for individuals or for groups? We strongly recommend the group approach. An early meta-analysis of training outcomes (Verhaeghen et al., 1992) demonstrated that group training has a larger effect size than individual training. There are several reasons to encourage a group approach. First, training for individuals tends to focus on single strategies or single core skills. In contrast, group training programs tend to be more comprehensive, offering not only strategy training, but also a focus on attention, beliefs about memory, and/or factual education about the aging process. These additional components, present in a multifactorial training program, seem to represent value-added (Gross et al., 2012).

A second reason that group programs may be more beneficial has to do with their potential social effects (Stine-Morrow, Parisi, Morrow, Greene, & Park, 2007; Stine-Morrow et al., 2014). In groups of seniors, it is likely that trainees will discover that their limitations are not as severe as those of other trainees, and that they are not alone in struggling in particular memory situations. This has the side benefit of making individuals much less anxious, and anything that helps older individuals to be less stressed about memory is beneficial (Hess et al., 2003; Welch & West, 1995). Interestingly, the social factors in training are considered so valuable that many researchers design studies with a social control group (Charness, 2007; Noice, Noice, & Kramer, 2014; Park et al., 2014) or compare groups that receive different forms of training, in order to control for the social elements of training (Ball et al., 2002; Cohen-Mansfield et al., 2014; Stine-Morrow et al., 2014).

Another important point to note is that many older adults are unwilling or uninterested in training as a solo learning exercise. Research shows, for example, that the greatest hindrance for older adult participation in lifelong learning programs is the lack of a "partner" in the class (Ostiguy, Hopp, & MacNeil, 1998). More specifically, drop-out rates are larger for older adults when they are randomly assigned to a self-taught program rather than to group training (Hastings & West, 2009). This preference exists even though self-taught programs often result in substantial benefit to trainees (Andrewes, Kinsella, & Murphy, 1996; Hastings & West, 2009; Stine-Morrow et al., 2014).

Several researchers are using group engagement paradigms for enhanced cognition; that is, offering broad social-cognitive engagement through senior volunteering in schools or school-like cognitive team activities (Hertzog et al., 2009; Park et al., 2014; Rebok, Carlson, & Langbaum, 2007; Stine-Morrow et al., 2007; Stine-Morrow et al., 2014). It is often assumed that the social elements of such activities contribute to the motivation to maintain participation over extended periods of time. It is too early to tell if these engagement-style programs will yield long-term memory benefits for participants, but preliminary reports are promising (cf. Carlson et al., 2008; 2009; Park et al., 2014; Stine-Morrow et al., 2014).

10.3.5 Real-world skills

The majority of training programs to date have focused on laboratory test performance. More recent paradigms using repeated practice have an even narrower focus, working to improve a specific sub-skill (Hertzog et al., 2009; Karbach & Verhaeghen, 2014; Morrison & Chein, 2011). As noted above, attempts to show that these two methodologies provide broad everyday memory benefits have typically failed, although there is evidence that practice in core skills may generalize to reasoning or executive functioning (Borella et al., 2010; Karbach & Verhaeghen, 2014; Morrison & Chein, 2011). Given that transfer of training from one memory task to another is seen only rarely (West & Crook, 1992; Willis et al., 2006), and that the observed transfer is typically what would be characterized as near transfer (to a task similar to the one trained), it would be logical for scientists to focus their training efforts directly on those real-world skills that older adults seek to improve (Stigsdotter-Neely, 2000). For example, teach older adults to remember names, to retain passwords, or to recall procedural knowledge needed for smart phones or computers. In other words, if transfer is not likely to occur, training should focus on the common memory concerns of older adults (American Institute for Research, 2014; Fisher, 2012). In fact, in the absence of a comprehensive training program to offer to clients, clinicians could just recommend that older adults practice repeatedly on those memory skills that they wish to improve. More research-based recommendations about specific ways to maximize the benefits of such practice would be helpful. Along those lines, there has been some interest in developing strategies to aid in prospective memory (Hering et al., 2014; Kliegel, Altgassen, Hering, & Rose, 2011), an important everyday skill (McDaniel & Bugg, 2012). A number of investigators have also suggested that it would be helpful to teach older adults how to make effective use of external aids in their everyday life (Craik et al., 2007; Hering et al., 2014; Kliegel, Martin, McDaniel, Einstein, & Moor, 2007; Shum, Fleming, Gill, Gullo, & Strong, 2011), which would expand training beyond the existing emphasis on promotion of internal memory processing.

10.4 Conclusions

Memory is a valued skill, important for older individuals' quality of life and ability to live independently. Yet, some memory processes are known to decline as a part of normal aging. Therefore, cognitive interventions, and specifically memory training, have been of interest to experimenters and clinicians for over six decades. When evaluating training programs that include control groups while examining pretest to posttest change in memory, several key points emerge.

First, training can effectively enhance episodic memory performance for healthy, older adults. Gains are greater when participants train in groups, and when multiple, rather than single, strategies are trained. Interventions currently focus on determining how to promote the practical impact of training, either through extension of training benefits to non-trained tasks, focusing on component sub-skills of memory processing, or by encouraging real-world engagement in cognition. While interventions typically do not succeed in enhancing non-trained memory tasks, modest research evidence suggests that the benefits of training may transfer to non-cognitive, real-world benefits and may have lasting impact.

Based on the reviewed research, we made several recommendations. One successful approach is a multifactorial group training program that includes multiple strategies and added information on topics such as normal aging, attention, metacognition, relaxation or self-evaluative memory beliefs. However, as practice and testing effects are well-documented, encouraging older adults to intensively practice the skills most important to them may be an effective alternative to elaborate training. Recent research focusing on self-monitoring, self-efficacy, and community-based engagement suggests that these approaches also have great potential. In short, there is compelling evidence that memory training will improve memory performance, at least in the short run, and growing evidence that its impact may be considerably broader.

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