Article

CLINICAL REHABILITATION

Clinical Rehabilitation
2014, Vol 28(2) 118–127

DOI: 10.1177/0269215513492541
cre.sagepub.com
SAGE

An occupation-based strategy training approach to managing age-related executive changes: a pilot randomized controlled trial

Deirdre Dawson[1,2,3], Julie Richardson[4], Angie Troyer[5,6], Malcolm Binns[1], Amanda Clark[1], Helene Polatajko[2,3], Gordon Winocur[1,6,7,8], Anne Hunt[1,3] and Yael Bar[1]

Abstract

Objective: To determine the feasibility of recruitment and retention of healthy older adults and the effectiveness of an intervention designed to manage age-related executive changes.
Design: A pilot randomized controlled trial.
Setting: Research centre and participants' homes.
Participants: Nineteen healthy, community dwelling older adults with complaints of cognitive difficulties and everyday problems, but no evidence of mild cognitive impairment, dementia or depression on objective testing.
Interventions: Seventeen hours of group and individual training. Participants in the experimental arm received education about self-management, successful aging and an occupation-based meta-cognitive strategy-training program. Participants in the control arm received education about brain health and participated in cognitively stimulating exercises.
Main measures: Changes on untrained, everyday life goals were identified using the Canadian Occupational Performance Measure. Generalization of benefits was measured using the Stanford Chronic Disease Questionnaire, general self-efficacy and changes in executive function (Delis-Kaplan Executive Function System Tower Test, Word Fluency and Trail-Making Test).
Results: 20% (19/96) of healthy older adults approached were eligible, consented and were enrolled in the study, 90% (17/19) were retained to three-month follow-up. Participants in the experimental arm reported significantly more improvement on untrained goals (11/22 compared with 9/46, χ^2=4.92, p<0.05), maintenance of physical activity (p<0.05) and better preparation for doctors' visits (p<0.05) relative to the control group. There were no significant between group differences on objective measures of executive function.
Conclusions: These data support the feasibility of a larger trial where a sample of 72 (36 participants in each arm) would be required to confirm or refute these findings.

[1]Rotman Research Institute, Baycrest Centre, Toronto, ON, Canada
[2]Department of Occupational Science and Occupational Therapy, University of Toronto, ON, Canada
[3]Graduate Department of Rehabilitation Sciences, University of Toronto, Toronto, ON, Canada
[4]School of Rehabilitation Science, McMaster University, Hamilton, ON, Canada
[5]Neuropsychology and Cognitive Health, Baycrest Centre, Toronto, ON, Canada
[6]Department of Psychology, University of Toronto, Toronto, ON, Canada
[7]Department of Psychiatry, University of Toronto, Peterborough, ON, Canada
[8]Department of Psychology, Trent University, Peterborough, ON, Canada

Corresponding author:
Deirdre Dawson, Department of Occupational Science & Occupational Therapy, University of Toronto, Suite 160-500 University Avenue, Toronto, ON, M5G 1V7, Canada.
Email: ddawson@research.baycrest.org

Keywords
Aging, cognitive impairment, controlled clinical trial, rehabilitation interventions, strategy-training

Received: 17 December 2012; accepted: 12 May 2013

Introduction

Maintenance of independent function while aging is a primary focus of older adults, the healthcare system and researchers. Age-related executive decline contributes to loss of independent function via its association with falls,[1] poor driving performance[2] and impaired ability to perform instrumental activities of daily living.[3] Indeed, the frontal lobes and their neural connections, known to be responsible for executive functions such as goal formation, planning and self-monitoring, are highly susceptible to the aging process.[4] This relationship between executive function and everyday problems leads to the following question: Can we maintain executive function while people age and thus enhance their abilities to live healthy and independent lives in their homes?

Several controlled trials with healthy older adults suggest that meta-cognitive strategy training, a practice standard for managing executive dysfunction in adults with acquired brain injury, may be beneficial. Positive benefits have been reported on simulated real-life tasks, self-reported executive functioning and on instrumental activities of daily living although for this latter finding, differences were not seen until the five-year follow-up.[5,6]

We wanted to determine whether it was possible to realise comparable benefits on real-world, non-simulated tasks immediately post-intervention. In addition, we wanted to determine whether participants could achieve, far transfer of training, that is whether the learning that occurred in the training could be applied in new contexts with the aim of allowing older adults to maintain their functional independence for longer periods time.[7] Pilot research suggests that using an occupation-based, strategy training approach, the Cognitive Orientation to daily Occupational Performance,[8] might accomplish our aims. In pilot studies with adults with traumatic brain injury, stroke and mild cognitive impairment we achieved far transfer of training effects with learning applied to novel, meaningful everyday life goals.[9–11] By definition, occupation-based training involves everyday activities that are meaningful to the individual. Meta-cognitive strategy-training (MST) is an approach that involves training participants to solve problems and/or attain goals through the application of a specific step-by-step approach. These features are cornerstones of the Cognitive Orientation to daily Occupational Performance approach.

Before considering a Phase III trial, we sought to determine: (1) feasibility of recruiting and retaining healthy older participants; and (2) effectiveness of the intervention in producing far transfer of training effects (i.e. meaningful real-world change) relative to an active control.

Our specific hypotheses were that, relative to the control group, participants receiving the occupation-based strategy training would:

1. exhibit significantly improved performance and improved satisfaction with performance on trained real-world activities identified by participants as things they needed and/or wanted to do but were having difficulty with;
2. show far transfer of training effects as evidenced by significantly improved:
   (a) performance, and satisfaction with performance, on untrained real-world activities;
   (b) general self-efficacy and everyday life health-related behaviours;
   (c) performance on standardized measures of executive function where a conscious planning strategy might improve task performance.

Methods

This pilot, randomized controlled trial with blind assessors randomized eligible consenting participants in blocks of four to two parallel groups: the experimental intervention (occupation-based strategy training) or the active control (education plus cognitively stimulating exercise). Randomization was performed using a random numbers table with assignment generated by the statistician (MB). Following baseline testing, the Research Assistant registered the participant and then opened the envelope with the next group assignment. Outcome measures were administered at baseline, postintervention and three-month follow-up by an assessor blind to group status. Study activities took place at the Rotman Research Institute, Baycrest, Toronto, Canada (testing and group sessions) and in participants' homes (individual sessions). The study was approved by the Baycrest Research Ethics Board and registered at clinicaltrials.gov (Identifier: NCT01163279). Participants were aware that they were being randomized to one of two protocols but were not aware which was the experimental or the active control arm of the study. All participants provided written informed consent.

Participants were recruited from a research subject pool and a community psycho-education program at Baycrest, a facility that provides a comprehensive system of care for aging patients, houses the Rotman Research Institute and is fully affiliated with the University of Toronto. All were community dwelling, healthy, older adults with subjective cognitive complaints (as measured by the Cognitive Failures Questionnaire)[12] who were fluent in written and spoken English, and scored within the normal ranges on tests of depression,[13] cognitive screening[14,15] and on a battery of neuropsychological tests of attention, memory and executive function. In addition, all participants were able to self-identify occupation-based problems with which they were having difficulty. Participants' cognitive status was characterized using a series of standardized neuropsychological assessments including Digit Span Forward to measure attention,[16] Digit Span Backwards and Digit Symbol[17] to measure working memory and the Wisconsin Card-Sorting Task[18] to measure executive function.

Both the experimental and active control arms included three group sessions (eight hours total) and nine individual one-hour sessions, provided by a trained research assistant (YB) over an eight-week period. Protocols were manualized and participants received copies of the materials used at their group sessions and of the work done in individual sessions. Both study arms ran concurrently in two blocks starting in September 2010 (n=9) and February 2011 (n=10). Recruitment for each block took approximately eight weeks. All sessions were videotaped and two of the authors, experienced in the experimental approach (DD, AH), trained the trainer (YB) and monitored all sessions to ensure treatment fidelity. If a participant missed a group session, the material was covered in an individual session. Missed individual sessions were re-scheduled whenever possible.

The experimental arm included two hours of education on executive function and life-style factors that contribute to successful aging, with the remaining sessions focused on learning and practicing the meta-cognitive strategy. Four key elements of the strategy training approach, an adaptation of the Cognitive Orientation to daily Occupational Performance,[8] were incorporated such that participants: (1) learned and practiced a four-step strategy (Goal-Plan-Do-Check) to improve performance in everyday problems that had been identified as difficult; (2) developed their own plans to solve their self-identified problems through a process of guided discovery; (3) attempted plans they developed between sessions (e.g., if the problem was related to use of email and they devised a plan to ask for assistance at a local library, they attempted to do this before the next session); (4) reviewed with the trainer their use of the strategy (Goal-Plan-Do-Check) in other activities in their everyday life.

In the active control arm, approximately half of the 17 hours consisted of didactic education on brain structure and function, age-related cognitive changes and general brain health issues. These materials were adapted with permission from the Brain-Health Workshop control protocol.[19] Cognitively stimulating exercises such as crossword and Sudoku puzzles made up the remainder of the sessions. Participants were encouraged to review education materials and complete additional cognitive exercises between sessions.

The primary outcome measure was derived from the Canadian Occupational Performance Measure, a standardized semi-structure interview that allows participants to identify problems in their everyday life, characterized as activities they need and/or want to do, but with which they are having difficulty.[20] All participants identified and scored four to six problems during the pre-intervention interview. In the experimental group, three of these problems provided the focus of the training and the remaining problems were not discussed (they remained untrained). In the active control arm, the problems identified in the interview were never discussed (they remained untrained). Each problem was scored on a performance and satisfaction with performance scale and participants provided their postintervention ratings without being reminded of their pre-intervention ratings. A change of two points on these ratings is considered clinically significant. Thus, the primary outcome was the proportion of untrained everyday life problems improved by two or more points in the experimental group compared with the control group. The changes in pre- to postintervention ratings of the untrained problems were considered a measure of far transfer of the training effects as improvement suggests application of the strategy training applied in a new context.

Secondary outcome measures used to further assess far transfer of training effects included:

1. selected scales from the Stanford Patient Education Research Center[21] to measure health-related behaviours;
2. the General Self-Efficacy Scale.[22]
3. the Delis-Kaplan Executive Function System (DKEFS) Tower Test and Verbal Fluency were used to detect hypothesized changes in executive function.[23] The DKEFS Trail Making Test was included as a control test as changes in speed of processing in response to the experimental intervention were not expected. The Tower Test was split into two forms by using alternate items.

Participants' characteristics of the two groups were compared using *t*-tests for continuous variables and Fisher's exact test for the categorical variable gender. A count of problems improved (in trained and untrained sets) was done. Poisson regression was used to explore group differences in the number of improved untrained problems (on the performance and satisfaction with performance scales) at posttraining and at three-month follow-up. The log-transformed number of identified untrained problems was included as an offset variable to accommodate differences in a number of untrained problems between the two groups. In the event of over-dispersion, the deviance scaling option was applied.

As per the CONSORT statement, we used intent-to-treat analysis.[24] In order to obtain convincing evidence that the experimental intervention was superior to the active control we used the worst score (zero) to impute missing values. Changes on the primary outcome were a count of the everyday life problems improved by two or more points with a proportional analysis conducted between the experimental and control groups.

Changes on secondary outcomes measures were analysed using 2 x 3 mixed model ANOVA with repeated measurements with group as a between-subjects factor and test-time (baseline, postintervention, three-month follow-up) as a within-subjects factor. Effect size is reported using partial eta-squared (η^2) as this statistic reflects the proportion of variance accounted for by the effect relative to the residual variance.[25] All hypothesis tests were performed at an alpha-level of 5%.

Results

Figure 1 provides the CONSORT flow diagram and details for the screening, enrolment and delivery of the intervention. Of 96 healthy older adults contacted, more than 1/3 (n=36) confirmed they had some difficulties in everyday life and were screened for inclusion. Participant characteristics at baseline are shown in Table 1. There were no significant differences between groups on any characteristic.

Two participants in the experimental group dropped out, one after five and the other after 10 hours of intervention creating a group difference in the hours of intervention received (p<0.01). The experimental group received an average of 13.16 hours (SD=3.49, range 5–17). One of the participants who withdrew indicated s/he routinely identified problems and set goals, made plans and executed them, had attained the desired performance on the

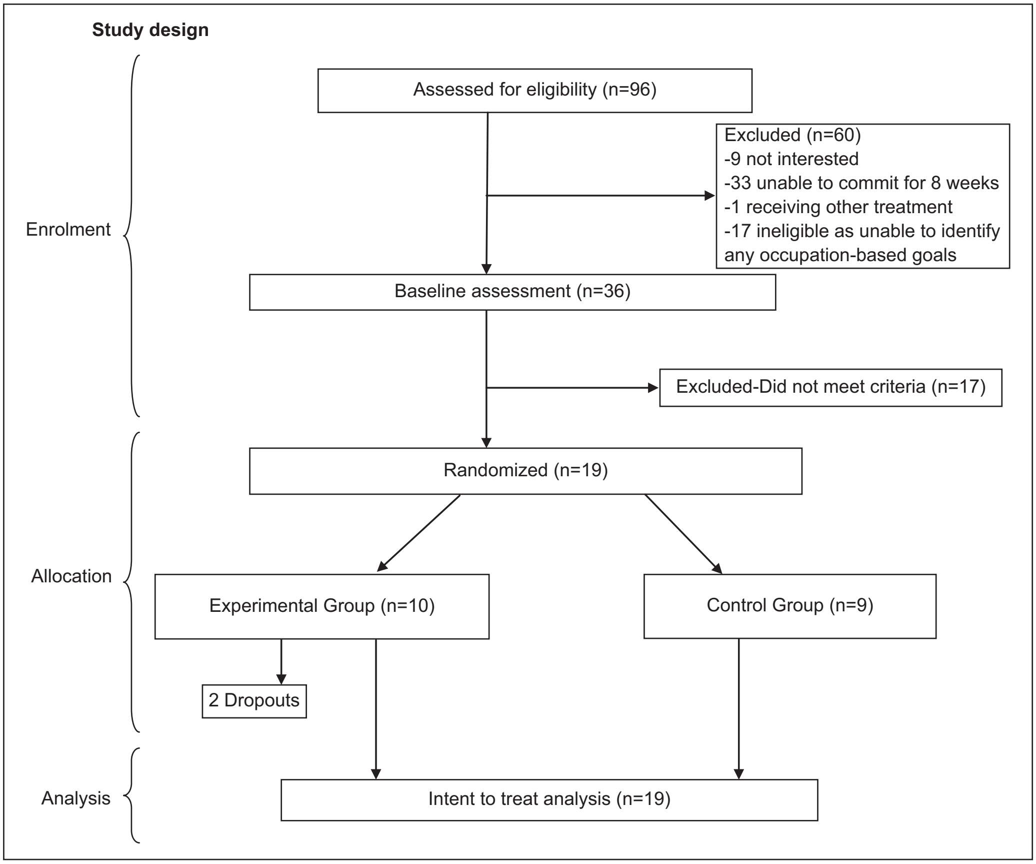

Figure 1. CONSORT flow diagram.

Table 1. Participant characteristics.

	Experimental (*n*=10) mean (±SD)	Control (*n*=9) mean (±SD)
Age in years	74.10 (±8.77)	73.67 (±5.43)
Sex	1 M, 9 F	2 M, 7 F
Education in years completed	15.70 (±1.83)	16.28 (±1.64)
CES-D	5.90 (±4.53)	3.33 (±3.46)
MoCA	27.40 (±1.84)	28.00 (±1.12)
TICS	40.30 (±4.45)	39.67 (±3.54)
Cognitive Failures Questionnaire	40.10 (±9.02)	34.33 (±9.34)
Digit Span Forward	10.70 (±2.36)	10.00 (±2.06)
Digit Span Backward	7.50 (±1.96)	6.67 (±3.91)
Digit Symbol	65.20 (12.99)	61.22 (±11.74)
HVLT Total Correct Score	27.30 (3.47)	27.56 (±3.36)
HVLT Delay Score	9.80 (2.35)	9.89 (±1.36)
Wisconsin Card Sorting Correct Trials	68.30 (5.23)	68.56 (±72.22)

SD, standard deviation; CES-D, Center for Epidemiological studies Depression scale HVLT, Hopkins Verbal Learning Test; MoCA, Montreal Cognitive Assessment; TICS, Telephone Interview for Cognitive Status.

Table 2. Number of problems improved by two or more points on the Canadian Occupational Performance Measure.

	Experimental (*n*=10)	Control (*n*=9)	Chi-square	*p*-value
Pretraining to posttraining comparison				
• Untrained problems improved on performance	11/22 (50%)	9/46 (19.6%)	4.92	0.03
• Untrained problems improved on satisfaction	11/22 (50%)	15/46 (32.6%)	0.99	0.32
• Trained problems improved on performance	21/30 (70%)	n/a	n/a	n/a
• Trained problems improved on satisfaction	22/30 (73.3%)	n/a	n/a	n/a
Pretraining to three-month follow-up comparison				
• Untrained problems improved on performance	8/22 (36.4%)	12/46 (26.1%)	0.37	0.54
• Untrained problems improved on satisfaction	10/22 (45.5%)	13/46 (28.3%)	1.28	0.26
• Trained problems improved on performance	19/30 (63.3%)	n/a	n/a	n/a
• Trained problems improved on satisfaction	21/30 (70%)	n/a	n/a	n/a

problems s/he had identified, and did not have any additional things s/he wanted or needed to address. The other indicated that s/he had used this type of approach throughout his/her working life and now s/he was retired just wanted to relax. All participants in the control group received the full 17 hours of the training. All 17 of the participants who completed the training also participated in the three-month follow-up. Thus, 17/19 participants were retained through the study.

All participants identified four to six everyday life problems through the Canadian Occupational Performance Measure interview and rated their performance and satisfaction with performance. There were no significant between-group pre-intervention differences on these ratings ($p>0.10$). Three of the problems were trained in the experimental arm. As shown in Table 2, at postintervention, more than two-thirds of these were reported as improving by two or more points on performance (21/30) and satisfaction with performance ratings (22/30). At the three-month follow-up, nine participants in the experimental arm maintained gains made on trained problems while one participant's ratings showed a return to baseline for performance on two trained problems and a return to baseline for satisfaction with performance for one problem.

Two or three problems identified by each participant in the experimental arm remained untrained (total of 22 problems) and all of the everyday problems for people in the control arm were untrained (total of 46 problems). Comparisons of improvements on performance of these untrained problems revealed a significant difference with 50% reported improved (by two or more points) in the experimental group (11/22) and less than 20% in the control group (9/46). Comparisons of reports of satisfaction with performance did not significantly differ. At follow-up testing, there was no significant difference between groups as four participants in the experimental arm reported performance and/or satisfaction with performance returning to baseline. However, six participants in the experimental arm did maintain the gains made on their untrained problems.

Hypotheses 2(b) and 2(c) stated that the experimental group would demonstrate far transfer of the training effects on self-efficacy, health-related behaviours and on performance on measures of executive function hypothesized to benefit from online or functional planning. There were no significant group differences on these measures at baseline. Repeated measures ANOVA did not show a significant group × time interaction for general self-efficacy (see Table 3). Within-group changes were significant for the experimental group, but the magnitude of change was very small. Significant group × time interactions, in favour of the experimental group, were found for physical activity and communication with physicians, with corresponding large effect sizes. In relation to physical activity, within-group analyses showed that the control group reported participating in significantly less physical activity at both posttest and follow-up. A closer look at these data showed that four of the participants in the experimental arm and seven in

Table 3. Changes in self-efficacy, general health behaviours and executive function.

Measure	Experimental (n=10) mean (SD)	Control (n=9) mean (SD)	ANOVA inter-action	Effect size[β]
General self-efficacy (10–40, higher = greater self-efficacy)			ns	0.01
– Pre	29.10 (3.41)	32.56 (3.40)		
– Post	30.90 (3.98)**	33.56 (4.28)		
– Three-month follow-up	30.50 (4.12)**	33.56 (3.43)		
General health behaviours				
General health (1–5, lower = better health)			ns	0.02
– Pre	2.20 (0.63)	1.89 (0.78)		
– Post	2.20 (0.42)	1.78 (0.83)		
– Three-month follow-up	2.20 (0.92)	2.00 (0.87)		
Health distress (0–20, higher = more health distress)			ns	0.03
– Pre	2.70 (2.21)	4.22 (2.77)		
– Post	3.80 (3.46)	3.67 (4.21)		
– Three-month follow-up	3.70 (3.37)	4.11 (2.03)		
Physical activity (hours/week)			0.02	0.21
– Pre	4.08 (2.22)	5.31 (1.47)		
– Post	4.45 (2.53)	3.64 (1.35)**		
– Three-month follow-up	4.15 (1.83)	3.19 (1.56)**		
Communication with physicians (0–15, higher = more preparation for visits and greater ability to ask questions)			0.02	0.22
– Pre	8.40 (3.84)	11.00 (3.04)		
– Post	9.50 (4.17)	9.11 (3.33)*		
– Three-month follow-up	10.00 (3.80)	8.89 (4.17)**		
Visits to physicians and emergency departments in past six months			0.11	0.12
– Pre	2.30 (0.95)	2.78 (3.07)		
– Post	1.50 (0.97)**	3.33 (4.00)		
– Three-month follow-up	2.00 (1.24)	2.33 (2.74)		
Measures of executive function				
DKEFS first move tower test			ns	0.02
– Pre	5.48 (3.72)	6.13 (5.83)		
– Post	3.00 (1.72)*	3.69 (2.89)		
– Three-month follow-up	2.47 (1.78)**	1.72 (0.71)**		
DKEFS Tower Test achievement score			ns	0.07
– Pre	17.10 (3.57)	15.78 (4.09)		
– Post	18.30 (3.59)	19.44 (4.07)**		
– Three-month follow-up	20.90 (4.31)**	18.89 (3.30)		
DKEFS word fluency			ns	0.01
– Pre	55.30 (15.25)	48.56 (11.74)		
– Post	56.40 (18.38)	50.33 (9.12)		
– Three-month follow-up	57.40 (16.34)**	50.11 (13.05)		
DKEFS trail making			ns	0.02
– Pre	104.50 (43.87)	91.11 (19.19)		
– Post	88.40 (28.55)	80.56 (25.37)		
– Three-month follow-up	94.10 (32.70)	84.44 (31.33)		

**significant difference from baseline, $p \leq 0.05$; *difference from baseline, $0.10 \leq p \leq 0.05$; [β]partial eta squared.
ANOVA, Analysis of Variance; DKEFS, Delis-Kaplan Executive Function System.

the control arm reported reduced levels of physical activity at follow-up. Further, six of the participants in the experimental group and four of the participants in the control arm had identified participating in physical activity as a problem area during the Canadian Occupational Performance Measure interview: this was addressed in the training for five of the six participants in the experimental arm. The control group also reported significantly lower scores at follow-up for items related to communication with physician. None of the participants identified this as a problem area.

No significant group × time interactions were found on standardized measures of executive functions. Within-group analyses showed both groups improved significantly on the DKEFS Tower Test Time to First Move. At posttest the control group showed a significantly improved achievement score that was attenuated at follow-up. The experimental group had significantly improved scores at follow-up for both the Tower Test Achievement Score and the Word Fluency test.

Discussion

The objectives of this pilot randomized controlled trial were three-fold: to develop a meta-cognitive strategy training protocol for use with older adults who subjectively report age-related cognitive decline; to determine feasibility of recruiting healthy older adults with subjective cognitive complaints and objective age-related executive function changes, but no clinical diagnoses to participate in a clinical intervention; and to ascertain whether the protocol would result in far transfer of training effects as a way of reducing older adults' everyday life problems. We found more than one-third of the older adults screened for the study, self-identified as having difficulties in everyday life and were willing to participate in additional testing: of these more than half enrolled to the study. Participants in the experimental group received an adapted form of the Cognitive Orientation to daily Occupational Performance.[8] This occupational strategy training approach appeared to benefit those in the experimental group as they reported improved performance on significantly more untrained everyday life problems relative to the active control group. Although the study was successful, one of the limitations was that we were unable to determine the reason(s) for the improvement in the experimental group as no significant differences were found on objective measures of executive function. Calculated sample size estimates suggest a future investigation of potential mechanisms for the effect is feasible.

We successfully developed a protocol for use with older adults from the Cognitive Orientation to daily Occupational Performance approach. Modifications to the approach included interactive group sessions with education about age-related changes in executive function, self-management of health issues and factors that contributed to successful aging. Collectively these enhanced the feasibility of this training approach and accrued the benefits of group support. The adapted protocol derives from a theoretical understanding of executive function in which the conscious application of an explicit strategy is used to overcome problems in the context of an impaired system. It may be that the provision of an explicit, executive strategy was responsible for the observed changes and/or that reported benefits are attributable to the education provided on about self-management techniques such as goal setting, decision making and scheduling, although the education was brief – approximately one and one-half hours in total. Reported benefits may also have arisen from the contextualized nature of the training: all training was undertaken with participants' self-identified problems with specific, meaningful, occupational activities. This is in keeping with adult learning theory, which suggests that adults readiness to learn is related to what they perceive they need to know and that their learning orientation is problem-centred and life-focused.[26] We posit that self-identification of training activities may be a critical ingredient of this intervention.

The finding that four of the ten participants in the experimental arm reported a reduction in their performance and satisfaction with performance at follow-up requires consideration. It is possible that response shift[27] in ratings on the Canadian Occupational Performance Measure may have contributed to the reduction of effect. For example, the importance of the problem may have changed, and/or participants may have recalibrated their internal meaning of 'good performance'. A related question is whether post- and follow-up ratings should be done blind to pre-intervention ratings. Evidence from a study of parent-proxy ratings found no clinically or statistically significant differences between blinded and unblended ratings[28] however, this question and the effects of response bias on Canadian Occupational Performance Measure ratings has yet to be systematically evaluated with other populations.

Our hypothesis for this study was that we would achieve everyday life benefits through training participants to use a meta-cognitive approach to manage age-related executive function changes. We expected that the training might also result in improvement on objective measures of executive function, which involve strategic elements such as the DKEFS Tower Test and the DKEFS Word Fluency Test. Although we did not find significant benefit for the experimental group relative to the control group, it is possible that the within-group changes observed in both the experimental and control group arose through different mechanisms: the improvements in the experimental group may have arisen through the use of the meta-cognitive strategy they were taught, whereas the improvements in the control group may have arisen from their carrying out cognitively stimulating activities. It is also possible that the effects seen arose through some other mechanism such as changes in mood. While no participants met the criteria for depression, subsyndromal depression cannot be completely ruled out as the source of participants' cognitive complaints. We did not measure mood at posttest or follow-up and do not know the extent to which mood changes may have influenced the results. Further, other chronic disorders (e.g. hypertension, heart disease, diabetes) that impact cognition and everyday life were not measured.

Significant group-by-time interactions for hours of physical activity and communication with physicians favoured the experimental group. It is possible that the experimental intervention assisted participants to adhere to their planned exercise regime, as exercise-related problems were identified by many participants and were one of the foci of training for five of the ten participants in that arm of the study. On the other hand, the observed interactions may have arisen owing to deterioration in the control group, particularly for the physical activity scale as the control group reported a significant within-group reduction in physical activity at both post-test and follow-up. This is a puzzling finding. Participants in the control arm may have redirected their free time from physical activity to the cognitively stimulating activities that formed part of the control intervention. More in-depth investigation of this area should be carried out in future research.

This is the first investigation of occupation-based strategy training with healthy older adults. The findings of this study in relation to feasibility (successful adaptation of the protocol, recruitment and retention) support the feasibility of a larger trial. Based on the data generated, we estimate that a sample of 72 older adults (36 in each arm) would be required to achieve a similar effect with 80% power. Preliminary evidence for benefit must be interpreted with considerable caution owing to the small sample size in this pilot study. Additional pilot studies would also be useful to investigate questions regarding other adaptations of the protocol (e.g. whether booster sessions would produce maintenance of the effects) and whether it would be feasible to recruit participants within the healthcare system (e.g. through primary care rather than a research institute). In addition, longer-term follow-up will be necessary to determine if these benefits produce ongoing successful aging.

Clinical messages

- Occupation-based, meta-cognitive strategy training is feasible as a large proportion (>30% in this study) of healthy older adults who self-identify with cognitive complaints in the absence of clinical diagnoses also identify problems in everyday life.
- A larger clinical trial is warranted as this research shows preliminary evidence for far transfer of training effects: learning that occurred in the training appeared to be applied in novel, everyday life contexts by participants in the experimental arm. A sample of 72 (36 participants in each arm) would be required to determine if a similar effect could be obtained with 80% power.

Conflict of interest

None declared.

Funding

This work was supported by grants from the Drummond Foundation and the Ontario Research Coalition.

References

1. Herman T, Mirelman A, Giladi N, et al. Executive control deficits as a prodrome to falls in healthy older adults: A prospective study linking thinking, walking, and falling. *J Gerontol A: Biol* 2010; 65A: 1086–1092.
2. Anstey KJ, Wood J, Lord S, et al. Cognitive, sensory and physical factors enabling driving safety in older adults. *Clin Psychol Rev* 2005; 25: 45–46.
3. Royall DR, Lauterbach EC, Kaufer D, et al. The cognitive correlates of functional status: A review from the committee on research of the American Psychiatric Association. *J Neuropsych Clin N* 2007; 19: 249–265.
4. Buckner RL. Memory and executive function in aging and AD: Multiple factors that cause decline and reserve factors that compensate. *Neuron* 2004; 44: 195–208.
5. Levine B, Stuss DT, Winocur G, et al. Cognitive rehabilitation in the elderly: Effects on strategic behavior in relation to goal management. *J Inter Neuropsych Soc* 2007; 13: 143–152.
6. Willis Sherry L, Tennstedt Sharon L, Ball K, et al. Long-term effects of cognitive training on everyday functional outcomes in older adults. *JAMA-J Am Med Assoc* 2006; 296: 2805–2814.
7. Zelinsky EM. Far transfer in cognitive training of older adults. *Restor Neurol Neurosci* 2009; 27: 455–471.
8. Polatajko H and Mandich A. *Enabling occupation in children: The Cognitive Orientation to daily Occupational Performance (CO-OP) approach*. Ottawa: CAOT Pub, 2004.
9. Dawson DR, Gaya A, Hunt A, et al. Using the cognitive orientation to occupational performance (CO-OP) with adults with executive dysfunction following traumatic brain injury. *Can J Occ Ther* 2009; 76: 115–127.
10. Skidmore ER, Holm MB, Whyte EM, et al. A case report examining the feasibility of meta-cognitive strategy training in acute inpatient stroke rehabilitation. *Neuropsych Rehab* 2011; 21: 208–223.
11. Wu A, Dawson DR and Troyer A. Applying CO-OP to older adults with age-related executive dysfunction. In: *Meaningful occupation: Enabling an ocean of possibilities*. CAOT Conference Guide, Halifax, Canada, Poster S7, p.51.
12. Broadbent DE, Cooper PF, Fitgerald P, et al. The Cognitive Failures Questionnaire (CFQ) and its correlates. *Br J Clin Psychy* 1982; 21: 1–16.
13. Haringsma R, Engels GI, Beekman ATF, et al. The criterion validity of the center for epidemiological studies depression scale (CES-D) in a sample of self-referred elders with depressive symptomatology. *Int J Ger Psych* 2004; 19: 558–563.
14. Brandt J, Spencer M and Folstein M. The telephone interview for cognitive status. *Cogn Behav Neurol* 1988; 1: 111–117.
15. Nasreddine ZS, Phillips NA, Bédirian V, et al. The Montreal Cognitive Assessment, MoCA: A brief screening tool for mild cognitive impairment. *J Am Geriatr Soc* 2005; 53: 695–699.
16. Wechsler DA. *Wechsler adult intelligence scale – revised manual*. New York: Psychological Corporation, 1981.
17. Wechsler DA. *WMS-III administration and scoring manual*. San Antonio, TX: The Psychological Corporation, 1997.
18. Heaton RK, Chelune GJ, Talley JL, et al. *Wisconsin card sorting test manual*. Odessa: Psychological Assessment Resources Inc., 2003.
19. Levine BL, Schweizer TA, O'Connor C, et al. Rehabilitation of executive functioning in patients with frontal lobe brain damage with goal management training. *Front Hum Neurosci* 2011; 5: 1–9.
20. Carswell A, McColl MA, Baptiste S, et al. The Canadian Occupational Performance Measure: A research and clinical literature review. *Can J Occ Ther* 2004; 71: 210–222.
21. Stanford Patient Education Research Center. *Chronic disease self-management program questionnaire code book*. 2007.
22. Sherer M and Adams CH. Construct validation of the self-efficacy scale. *Psychol Rep* 1983; 53: 899–902.
23. Delis DC, Kplan E and Kramer JH. *Delis-Kaplan Executive Function System. Examiner's manual*. San Antonio, Texas: The Psychological Corporation, Harcourt Assessment Company, 2001.
24. Moher D, Hopewell S, Schulz KF, et al. CONSORT 2010 explanation and elaboration: Updated guidelines for reporting parallel group randomised trials. *J Clin Epidemiol* 2010; 63: e1–e37.
25. Richardson JTE. Eta squared and partial eta squared as measures of effect size in educational research. *Educ Res Rev* 2011; 6: 135–147.
26. Merriam SB, Caffarella RS and Baumgartner LM. Learning in adulthood: A comprehensive guide. 3rd edn. San Francisco, California: Jossey-Bass, 2007.
27. Schwartz CE. Applications of response shift theory and methods to participation measurement: A brief history of a young field. *Arch Phys Med Rehabil* 2010; 91: S38–43.
28. Wallen MA and Ziviani JM. Canadian Occupational Performance Measure: Impact of blinded parent-proxy ratings. *Can J Occ Ther* 2012; 79: 7–14.