ASSESSING THE EFFICACY OF A BRIEF EVERYDAY PROBLEM-SOLVING TRAINING PROGRAM FOR OLDER ADULTS

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We developed and evaluated the efficacy of a novel training procedure designed to enhance older adults' everyday problem-solving ability, namely, their capacity to generate viable solutions for problems of daily living. We developed parallel sets of everyday problems to examine the impact of training on problem-solving ability among a sample of younger and older adults. In Study 1, we administered a one-hour training consisting of a tutored session (experimenter to participant) to improve everyday problem-solving abilities among older adults (60-73 years old). The results indicated that there was a significant enhancement in performance for those subjects trained to solve everyday problems. Training also improved people's perceived self-efficacy for everyday problem solving. In Study 2, we tested the stability of this novel training procedure on a new sample of younger adults (20-29 years old), young-older adults (65-74 years old) and older adults (75-84 years old). The results corroborated the findings of Study 1 in that participants performed better on everyday problem solving after being specifically trained.

Key words: Everyday problem-solving; Training; Cognition; Self-efficacy; Aging.

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INTRODUCTION[1]

A major challenge for psychological science is the translation of basic research findings into beneficial applications. An application of central interest to psycho-gerontology is that of training procedures designed to enhance people's cognitive abilities (Fernandez-Ballesteros, 2005; Willis, 2001). Much work has evaluated the effects of training on memory performance (see Storandt, 1991). Investigators commonly document positive training effects and explore the question of whether one versus another component of training differentially improve memory skills (Flynn & Storandt, 1992; Scogin, Prohaska, & Weeks, 1998).

More recently, the results of the Advanced Cognitive Training for Independent and Vital Elderly (ACTIVE) study (Ball et al., 2002) demonstrated that multiple-trial training procedures (several weeks of intervention) can offset declines in abstract problem solving and speed, in addition to memory. Specifically, researchers were able to produce positive results that remained stable over a period of two years after training with multiple-trial training intervention procedures that lasted several weeks (see Ball et al., 2002). Conversely, little attention has been devoted to the development of training procedures that could enhance older adults' functioning in their day-to-day routine, namely, everyday problem solving.

Everyday problem solving refers specifically to people's capacity to solve problems similar to those encountered in daily life (Allaire & Marsiske, 2002; Berg & Klaczynski, 1996). Although such problems arise at all points in life, changes associated with aging into older adulthood are particularly relevant to questions of everyday problem solving (Cheng & Strough, 2003). In older adulthood, physical and mental declines may cause previously routine activities to become difficult (Hoare, 2006). Lifestyle changes (e.g., retirement, changing health status, children moving out of the home) create problems that are novel and often difficult to overcome. These lifestyle changes and the novel problems they bring require the development and implementation of new everyday problem-solving skills.

A second benefit of targeting everyday problem solving is that, in addition to extensive multi-session training procedures, briefer procedures that would warrant a much more flexible approach to research intervention could be used. Concepts and methods in experimental social and personality psychology offer guidance to the development of such brief everyday problem-solving training. Social psychological research has documented beneficial effects of interventions that are brief. Nisbett, Fong, Lehman, and Cheng (1987) found that people's reasoning about everyday events could be improved via brief training procedures. Even brief practice in making one versus another form of inference can influence cognitive processing over periods lasting at least a day (Gilovich, 1981; Smith, 1990).

KEY FEATURES OF EVERYDAY PROBLEM SOLVING

In defining the unique features of everyday problems, many investigators adopt the distinction introduced by Reitman (1964) and Simon (1973) between problems that are ill-defined versus problems that are well-defined (Allaire & Marsiske, 2002; Denney, 1990). Well-defined problems present an unambiguous initial state, a means to a solution, and an end state that usually consists of a single end point to be reached. An oversimplified version of a mathematical problem, would be the equation: 2 + 2 = ?. All the elements, such as mathematical operators (+, =), initial state (2 + 2), and end state (= ?) are clearly available to the problem solver, who will find the only logical solution to the problem: 4. Well-defined problems substantially more complex than that are commonly employed in research on reasoning ability (Anzai & Simon, 1979). In contrast, when solving ill-defined problems, one or more of the three elements of the problem space (initial state, a means to solution, and the end state of the problem) are not clearly stipulated (e.g., I would like to improve my relationship with my boss). Everyday problems used in the present study are of this sort (see Appendix for a list of everyday problems).[2]

The resources available for everyday problem solving, the pathways that can be pursued, and the exact end states of the everyday problem may all be ambiguous. These challenges have led many investigators to study everyday problem solving by assessing the number of viable solutions that individuals are able to generate when presented with everyday problems (see Artistico, Cervone, & Pezzuti, 2003; Denney & Pearce, 1989; Denney, Tozier, & Schlotthauer, 1992; Sinnott 1989; Thornton & Dumke, 2005, for an overview).[3]

Consequently, in order to measure solution fluency, researchers proposed to consider only effective and/or safe solutions that address the problem with some degree of predictable success (Allaire & Marsiske, 2002; Berg & Klaczynski, 1996; Berg, Meegan, & Deviney, 1998; Denney, 1990, Willis, 1996).

Some researchers suggested additionally rating the effectiveness of provided solutions (Thornton & Dumke, 2005). However, when Thornton and Dumke (2005) analyzed the unique contribution of quality of solutions in everyday problem solving in their comprehensive meta-analysis, they found that quality neither mediated nor moderated participants' ability to solve everyday problems. The number of viable solutions and participants' satisfaction were entered into the equation alongside an index of solution quality. This solution quality index was not related to the number of viable solutions nor was it related to participants' satisfaction.

Solution fluency, then, has the advantage of being an objectively measurable index (see Denney, 1990, for an overview of these issues; also see Sinnott, 1989, 1998). Additionally, it has been demonstrated that individual differences in solution fluency assessed in the lab are related to variations in older adults' behavioral intentions in real life (Patrick & Strough, 2004).

Researchers have also recommended scoring solutions that older adults might consider sub-optimal due to their greater life experience, using a procedure implemented by Denney, Tozier, and Schlotthauer (1992) that consists of asking participants to devise solutions including those that they might not choose to adopt themselves (Artistico et al., 2003; Artistico, Orom, Cervone, Krauss, & Houston, in press).

HYPOTHESES

Specifically, we tested a brief training procedure consisting of only a single verbal training session. The training was aimed to facilitate older adults' solution fluency with regard to everyday problems. Thus, we anticipated that this training procedure would improve older adults' everyday problem-solving ability by rendering them more capable of devising alternative solutions to everyday problems.

In making this prediction we noted that older adults who possess a robust sense of self-efficacy outperform those who possess a lower sense of self-efficacy for solving everyday problems (Artistico et al., 2003). This holds true because subjective appraisals of personal efficacy contribute to motivation and achievement on tasks that require sustained cognitive effort (Bandura, 1989; Haught, Hill, Nardi, & Walls, 2000). When people are expected to participate in structured training procedures, self-efficacy appraisals are powerful mechanisms for determining behavioral changes and adherence to training interventions (see Bandura, 1997).

We tested these predictions in two studies. In Study 1, we drew upon a simple test-retest experimental design with one control group, by selecting two samples of older adults (e.g., Baltes & Mayer, 1999; they considered older adults people aged from 70 to 100). In Study 2, we expanded the experimental design to include two control groups while also assessing the stability of our training among younger adults (20-29 years old), young-older adults (65-74 years old) and older adults (75-84 years old).

STUDY 1

Method

Participants

Ninety-nine participants (*M age* = 65.31*, SD* = 3.42) living in South-Eastern Italy were successfully recruited and tested by two clinical psychologists. The original number of participants enrolled in the study was 107, but eight participants dropped out of the study, after initial contact. Participants were not paid for their time, and their participation was entirely voluntary.

Background assessments of participants' cognitive abilities and motivation for everyday problem solving yielded null results regarding the differences between the two groups. Specifically, we assessed participants' cognitive abilities via the Wisconsin Card Sorting Test (WCST; Grant & Berg, 1948) and participants' baseline motivation to cope with everyday problems via a questionnaire developed and validated for the Italian population (Artistico & Pezzuti, 2002). Indexes of cognitive performance were gauged on the number of errors that participants in the two groups made on the WCST. The experimental group's total number of errors (M = 9.30, SD = 5.11) was not different from that of the control group (M = 9.04, SD = 5.36), $t < 1$. The experimental group's total number of perseverative errors (one WCST measure of cognitive rigidity; Grant & Berg, 1948) (M = 4.96, SD = 3.73) was not different from that of the control group (M = 4.71, SD = 2.69), $t < 1$. Motivation to engage in the solution of everyday problems was not different between the experimental (M = 73.45, SD = 4.56) and the control group (M = 73.98, SD = 5.73), $t < 1$.

Participants were recruited for a two-session test-retest study. Sessions were conducted at the participants' homes, and were arranged at a time convenient for the participant. The two sessions were scheduled approximately one week apart. There was no attrition between sessions.

Session 1 was conducted to gauge baseline measures, problem solving, and self-efficacy levels (see below). In session 2, participants were randomly assigned to one of two groups: experimental and control. Fifty-three older adults were in the experimental (training) group (27 men and 26 women; *M age* = 64.91, *SD* = 3.54; *M years of education* = 9.79, *SD* = 4.67; married = 67.9%, widowed = 18.9%, divorced = 5.7%, never married or single = 7.5%). Forty-six older adults were in the control group (21 men and 25 women; *M age* = 65.78, *SD* = 3.25; *M years of education* = 9.13, *SD* = 4.70; married = 63%, widowed = 19.6%, divorced = 6.5%, never married or single = 10.9). Statistical analyses comparing the background information across groups yielded non-significant results: age, $t(97) = 1.28$, $p = .21$; years of education, $t < 1$. Similarly, marital status did not differ between the two groups (chi-square < 1). In this second session, participants also solved everyday problems (see Appendix, Version A of Study 1) and completed self-efficacy scales.

Everyday Problems: Procedure, Solution Scores

Participants worked on everyday problems that were ecologically relevant to the life of older adults. The problems were developed through an extensive pilot study (see Pezzuti, 1999), that was designed to identify everyday problems representative of those commonly experienced by older adults, as well as to create a database of viable solutions to these problems. Pezzuti (1999) identified two sets of everyday problem-solving stimuli, comprising parallel versions of an assessment of everyday challenges, ecologically relevant to older adults' lives. These two sets of everyday problems were equivalent in terms of mean number and standard deviation of number of solutions generated; they also correlated significantly with other indices of performance (see Pezzuti, 1999). The problems tapped into a range of common instrumental and interpersonal challenges. Participants were presented with five everyday problems in each of the two sessions. The ten problems are reported in the Appendix (Study 1: Version A and B).

Participants were given oral and written descriptions of five problems, in order to assess performance in everyday problem solving. Prior to this assessment, participants were reminded that everyday problems are open to multiple solutions and that their task was to devise as many solutions as possible to a set of problems. Specifically, participants were instructed to listen carefully to each problem, and then provide as many relevant solutions as possible. They were encouraged to provide a solution even if it were one that they personally might not choose to adopt; this instruction was given to ensure that we assessed the maximal number of solutions participants could provide. Specifically, the experimenter asked all participants to think about what other people might do in order to solve the problem and to formulate all the possible solutions that they could think of, but might choose not to adopt. Verbal and written instructions emphasized that problems had neither correct nor incorrect responses, and that interviewees could take as much time as they wished to respond to each problem. The order of the presentation of the problems was randomized for each participant.

To determine peoples' ability to solve everyday problems, we computed an index by summing the number of effective solutions participants generated. We counted each solution addressing the problem effectively; wishful thinking was not counted as an effective solution.

Two judges, who did not know participants' ages and research hypotheses, evaluated transcripts of the solutions generated by each participant. Judges counted as solutions distinct actions, including verbal statements, that could contribute to problem solving. Sentences that had no potential to solve the problem (e.g., "I wish I did not have this problem") were not counted. Solutions that were stated ambiguously or in a general way (e.g., "try to increase your social network to cope with loneliness") were coded as a solution only if the problem solver did not elaborate on them. If the problem solver elaborated on the general solution (e.g., "participate in church activities, go to family meetings, invite friends home and ask them to bring new friends, volunteer your time at community centers," etc.), the coders coded only the specific solutions as viable solutions without including the general one. The two coders were in agreement on 83.6% of cases for the first set of everyday problems, and on 81.4% for the second set. With the help of two supervisors, disagreements were fully resolved, yielding complete inter-judge agreement.

Training in Everyday Problem Solving

Training in everyday problem solving was conducted at the outset of the second session of the study. To ensure that training was of great personal relevance to the participant, the solutions provided in session 1 were used as working material for session 2.

Session 2 training procedure began with the experimenter informing each participant they would review together the solutions that the participant provided in the first session. The exact details of this review varied from case to case, depending on participant's session 1 responses. Nonetheless, the training was designed to convey a number of basic principles. The first principle was that people often perform sub-optimally (i.e., they provide only a few solutions) on everyday problems because they focus too narrowly on what is, in reality, only a subset of the overall problem space (i.e., the set containing all possible effective solutions). By expanding peoples' conception of the overall problem space in session 1 problems, it was expected that participants would develop a novel problem-solving skill making them less likely to overlook effective solutions. To that end, the experimenter read each participant's solutions and asked the participant if he/she could devise additional solutions. After a few attempts at identifying at least one additional solution to the problem, the experimenter noted the following: a) that it was difficult to add solutions to the same problem after already having solved it, and b) that a new analysis of the problem is required in order to come up with additional solutions.

The new methodology used in this study allowed us to identify elements of the problem that were not made apparent in participants' initial solutions. For example, participants were presented with a problem involving a circumstance in which a group of people needed a taxi to get to a movie that was starting soon. The difficulty was that the group was too large to fit into one taxi. In this problem, a variety of elements — some of which are commonly overlooked at first — may help or hinder the group (i.e., there is another taxi behind the first one, or it is already too late to get there in time, so the solutions could become "take two taxis," "go to a later show with more time to arrange effective transportation," "take the bus," "walk," etc.). Another problem was related to financial security. In this circumstance, the person's ability to work was not explicitly stipulated in the problem. If the participants failed to consider this element in session 1, the experimenter stated the implicit existence of this possibility during session 2 training. The experimenter could further explain that once this option is considered, a large number of potential solutions is identified (e.g., "the person can look for a job"; "if the person is already working, he/she can look for and obtain a better job"; "the person can work long hours and make some extra money"; "if the person is a professional, he/she can do some independent consulting work and supplement his income by charging an hourly rate").

By drawing attention to these overlooked elements of the problem, the intention was for the training to instill in participants the tendency to exert greater mental effort in reframing problems and considering all possible contingencies. This could also expand the solution space being considered, which, in turn, could enable persons to generate more solutions than would be possible otherwise. In this way, the experimenters modeled the cognitive skill of considering all aspects of the problem space, including novel contingencies or elements not initially stated in the formulation of the problem, relevant to solutions to a given problem.

The training procedure also included active problem-solving efforts on the part of participants. Specifically, they were asked to identify additional elements in the problems and then to provide additional solutions to each of the five problems solved in the previous session. At the end of this procedure, all participants in the experimental group were able to go beyond the formulation of the problem by finding additional elements, not initially stipulated in the problem, ultimately leading to additional solutions.

After the training procedure, a 15-30 minute break was given, followed by the assessment of participants' capacity to generate solutions to the novel set of problems. The problem-solving instructions in session 2 were the same as those in session 1.

In the no-training control condition in session 2, the experimenter began by asking participants if they had questions regarding their prior work. If they did, the experimenter answered them before continuing on with session 2. The experimenter then informed participants that everyday problems are open to multiple solutions and, therefore, one needs to devise many alternative options in order to solve the problem at hand. The experimenter then conducted session 2 problem solving, in the same manner as in the training condition.

Self-Efficacy Scales

In addition to problem solutions, we also assessed participants' perceptions of self-efficacy for solving everyday problems. This was done via a self-report questionnaire. All participants completed self-efficacy questionnaires before each session of the study. Respondents indicated their confidence in providing an increasing number of solutions to a given problem (from "I can think of one solution to this problem" to "I can think of more than five solutions to this problem") on 0-100 (expressing their confidence in percentage). Prior to this assessment, the experimenters explained that everyday problems are open to multiple solutions and that it is valuable to be able to generate more than one solution to a given problem. These questions were embedded in a longer questionnaire that contained 10 filler items. At each assessment, the internal consistency of the self-efficacy items met or exceeded $\alpha = .80$.

Results

Problem Solving

Our main hypothesis was that training would increase older adults' everyday problem-solving performance, in comparison to performance in the no training control condition. We tested this prediction using a mixed design with two factors, a between-subjects factor (training group vs. control group) and a within-subjects factor (baseline vs. first follow-up). As predicted, there was a significant interaction between these two factors, $F(1, 97) = 54.60$, $p < .001$, an effect of condition (training group vs. control group), $F(1, 97) = 50.11$, $p < .001$, and an effect of sessions (baseline vs. first follow-up), $F(1, 97) = 13.86$, $p < .001$.

We conducted post-hoc tests to interpret these findings. There were no significant differences in the solutions generated by participants at baseline (session 1): participants in the experimental group provided 3.40 solutions ($SD = 0.62$), and participants in the control group provided 3.37 solutions ($SD = 0.57$), $t < 1$. In the follow-up, the training group provided more solutions than the control group, $t(97) = 9.44$, $p < .01$ (see Table 1). As is commonly found in this literature, the "years of education" variable was significantly correlated with everyday problem-solving performance: session 1, $r(97) = .35$, $p < .05$; and session 2, $r(97) = .27$, $p < .05$.

The initial analysis was followed by an ANCOVA, in order to examine whether the interaction term would remain significant in the presence of education as a covariate. Even considering years of education, the interaction between session and condition remained significant, $F(1, 97) = 53.78$, $p < .001$.

TABLE 1
Problem-solving means and standard deviations

	Condition	
Session	Control group	Training group
Baseline	3.37 (0.57) a	3.40 (0.62) a
Follow-up	3.00 (0.63) b	4.35 (0.76) c

Note. The same letter, in the same row or column, indicates that the two means are significantly different, $p < .05$. Standard deviations in parentheses.

Thus, the brief training procedure substantially increased everyday problem-solving performance; after training, participants provided more solutions to everyday problems than they had previously done. In contrast, performance in the second session slightly declined for participants in the control group (Table 1).

Perceived Self-Efficacy and Everyday Problem Solving

Variations in performance were paralleled by variations in perceived self-efficacy. There was a significant effect of the condition factor (training group vs. control group), $F(1, 96) = 14.64$, $p < .001$, and of the session factor (baseline vs. first follow-up), $F(1, 96) = 52.97$, $p < .001$. The interaction between condition (experimental/control) and training (before and after training) was also significant, $F(1, 96) = 5.16$, $p < .05$ (Table 2).

TABLE 2
Means and standard deviations for perceived self-efficacy

	Condition	
Session	Control group	Training group
Baseline	42.39 (12.57) a	47.15 (16.84) a
Follow-up	38.46 (11.20) b	55.94 (14.93) c

Note. The same letter, in the same row or column, indicates that the two means are significantly different, $p < .05$. Standard deviations in parentheses.

Participants in the experimental group increased their levels of self-efficacy from baseline to first follow-up, $t(51) = 43.94$, $p < .01$. In contrast, participants in the control group did not increase their levels of self-efficacy from baseline to first follow-up, $t(52) = 1.02$, $p = .311$. Before the training (at baseline), there were no differences between the two groups in perceived self-efficacy, $t(97) = 1.51$, $p = .13$. However, the two groups differed significantly after training, when participants in the experimental group reported higher perceived self-efficacy than participants in the control group, $t(97) = 2.31$, $p < .05$.

There were significant correlations among measures of everyday problem solving and perceived self-efficacy. In the experimental group, correlations were: $r(51) = .44$, $p < .05$, before training, and $r(51) = .26$, $p < .10$, after training. In the control group, correlations were: $r(44) = .03$, *ns*, at baseline, and $r(44) = .43$, $p < .05$, at first follow-up.

STUDY 2

The results obtained in Study 1 with the use of a brief, one-session, verbal training procedure suggest that, in applied settings, everyday problem-solving abilities can be substantially enhanced. The work presented in Study 1 was a first research with some limitations. First, results concerned young-older adults. Younger adults are more capable of providing solutions to everyday problems (Thornton & Dumke, 2005). However, when everyday problem solving is measured in contexts relevant to older age, older adults perform significantly better than do younger adults (Artistico et al., 2003, in press). Second, because training was specifically designed to increase the number of generated solutions in a single experimental session, it is impossible to observe whether such training may be related to actual everyday problem-solving ability some time after the training.

These two limitations were addressed in Study 2, which was designed as a multi-session study; the goal was to demonstrate the lasting character of our training procedure for younger and older adults. Thus, the aim of Study 2 was to replicate and improve the findings obtained in Study 1. Specifically, we further developed our methodology by including three different age groups (younger adults, 20-29 years old; young-older adults, 65-74 years old; and older adults, 75-84 years old). These samples were tested over a period of one month in which we conducted one baseline session (session 1) and two follow-up sessions (session 2 and session 3).

Method

Participants

One hundred and forty-four community-dwelling adults from Southern Italy were recruited on a volunteer basis. Four participants were lost due to attrition over the course of the multi-session procedure, yielding a final sample of 48 younger adults (50% female; 20-29 years old, *M age* = 24.10, *SD* = 2.78), 47 young-older adults (about 50% female; 65-74 years old, *M age* = 68.98, *SD* = 3.42), and 45 older adults (53% female; 75-84 years old, *M age* = 78.51, *SD* =

3.27). All participants were Italian native speakers with $M = 11.81$ ($SD = 2.53$) years of formal education (younger adults, $M = 13.60$, $SD = 1.14$; young-older adults, $M = 11.40$, $SD = 2.22$; older adults, $M = 10.33$, $SD = 2.80$).

We administered the Mini Mental State Examination (MMSE) to determine whether cognitive impairment was present among our participants (younger adults, $M = 29.10$, $SD = 1.32$; young-older adults, $M = 27.80$, $SD = 1.85$; older adults, $M = 27.29$, $SD = 1.59$). All participants, including individuals older than 75 years, reported a score that was within the range of normality ($M = 28.09$, $SD = 1.76$), as computed in the Italian normative population ($M = 27.70$, $SD = 2.60$). As commonly reported in the literature, younger adults scored higher on the MMSE than did older adults, $F(2, 137) = 15.99$, $p < .001$; however, participants in the two older age groups did not differ on the MMSE, $t(90) = 1.44$, $p < .16$.

Procedure: Experimental Design and Different Experimental Conditions

To test our main hypothesis that the training developed in Study 1 produces lasting performance improvements, we created a mixed design: type of Condition × Sessions, with sessions as a within-participants factor. Finally, because age is often a significant variable in this field, we added age as another between-subjects factor with three levels (younger adults, young-older adults, older adults). Regarding conditions, condition 1 was the experimental group, in which participants received training on how to solve everyday problems. The first condition was identical to the one described in Study 1 (Method section). Condition 2 was considered "meta-cognitive" because we trained participants on how to solve everyday problems. Participants were asked to answer four specific questions related to their problem-solving ability. The four questions were as follows: 1) "What does it mean to solve everyday problems at your age?" 2) "What do you need in order to solve everyday problems?" 3) "What do you think when solving everyday problems?" 4) "What do you feel when solving everyday problems?." The experimenter, a clinical psychologist, listened to participants' answers and positively reinforced the concept of alternative solutions. This was similar to what was taught in the experimental condition (condition 1). The primary difference was that knowledge was not implemented in a step-by-step manner, and, perhaps most importantly, was not explicitly linked to the solutions provided in session 1 of the study. Condition 3 was the control group, in which participants did not receive any training.

The factor "sessions" was the within-subjects factor, represented by the three assessment phases (session 1, session 2, session 3). Session 1 and session 2 were held one week apart, and session 3 was held one month after session 1. The addition of session 3 allowed us to overcome the primary limitation of Study 1, by assessing the temporal stability of the training effects. Session 1 was conducted similarly to Study 1, in which participants were asked to provide solutions to a set of problems (see Appendix, Study 2, Problems: Version A). In session 2, participants in the experimental condition received the specific novel training procedure developed in this study, whereas those who were in the control conditions received the meta-cognitive training or simply the instructions. In session 2, all participants solved the set of problems reported as Version B of Study 2 (Appendix). Finally, in session 3, participants solved the set of problems reported as Version C of Study 2 (Appendix), without receiving any training.

Everyday Problem-Solving Measures and Stimuli

Similarly to Study 1, we asked participants to solve everyday problems that were presented in each of the three parallel versions of the same test (see Appendix, Study 2; refer to Study 1 for detailed descriptions of the experimental procedure, solution scores, and training procedures adopted). Notably, in Study 2 we used three everyday problems instead of the five used in Study 1. We also included a third parallel version of the everyday problems list, Version C, for use in session 3. Each version of the test included three problems: one was interpersonal, one instrumental, and one was both interpersonal and instrumental.

As in Study 1, two independent judges scored the number of solutions provided by each participant. Inter-rater agreement was 82.8%. Preliminary item analysis showed that, within the three versions of the test, there were no significant differences among the problems on the number of alternative solutions provided by participants in this study: Version A, $F(2, 278) = 1.32$, $p = .27$; Version B, $F(2, 278) = 1.92$, $p = .15$; Version C, $F < 1$. Thus, we averaged the total number of solutions provided for each test to gauge the main dependent measures of the study.

Self-Efficacy Scales

Self-efficacy was assessed as in Study 1, with the exception of the measures relative to Version C, which was not used in Study 1 ($\alpha = .83$, Version A; $\alpha = .88$, Version B; $\alpha = .88$, Version C). Preliminary analysis indicated that, similarly to Study 1, measurements of self-efficacy tended to correlate with everyday problem-solving ability ($r = .37$, $p < .01$). However, self-efficacy did not mediate (Baron & Kenny, 1986) the impact of the training conditions; thus we excluded this measure from the main result section.

Results

For the solution fluency we expected an interaction between Age, type of Condition, and Sessions. We conducted an ANOVA with three independent variables: age (younger adults, young-older adults, older adults), condition (experimental, meta-cognitive, control), and sessions (baseline, first follow-up, second follow-up). Sessions was a within-subject factor, whereas age and condition were measured between subjects. The total number of alternative solutions provided by participants to the problems was the dependent measure. ANOVA showed that the three-way interaction Age × Condition × Sessions was not significant, $F < 1$. All the main effects were instead significant: condition, $F(2, 131) = 21.62$, $p < .001$, age, $F(2, 131) = 13.84$, $p < .001$, and sessions, $F(2, 262) = 27.54$, $p < .001$.

The interaction Condition × Age was not significant, $F(4, 131) = 1.26$, *ns*. There was a strong interaction Sessions × Condition, $F(4, 262) = 22.94$, $p < .001$, indicating that participants in the experimental condition performed better after being trained (see Table 3).

TABLE 3
Means and standard deviations for the interaction Condition (control, metacognitive, experimental) × Sessions (baseline, first, and second follow-up)

	Sessions		
	Baseline	First follow-up	Second follow-up
Control condition (*N* = 48)	10.87 (2.43)	10.46 (2.06)	10.64 (2.60)
Meta-cognitive condition (*N* = 48)	11.25 (2.64)	12.52 (2.58)	10.73 (1.65)
Experimental condition (*N* = 44)	11.29 (2.63)	15.00 (3.19)	14.20 (3.57)

Note. Standard deviations are reported in parentheses.

Finally, there was a two-way Sessions × Age interaction, $F(4, 263) = 3.63$, $p < .01$, showing that at a younger age the training could be more predictive of performance, as demonstrated by the fact that younger participants who were trained were the best at problem solving in both session 2 and session 3 (see Table 4).

TABLE 4
Means and standard deviations for the interaction Sessions (baseline, first, and second follow-up) × Age (younger adults, young-older adults, older adults)

	Sessions		
	Baseline	First follow-up	Second follow-up
20-29 yrs (*N* = 48)	12.60 (2.40)	13.29 (3.40)	13.33 (3.48)
65-74 yrs (*N* = 47)	10.47 (2.27)	12.79 (3.05)	11.34 (2.48)
75-84 yrs (*N* = 45)	10.27 (2.33)	11.64 (2.96)	10.62 (2.72)

Note. Standard deviations are reported in parentheses.

A final analysis was performed to further examine the effectiveness of the novel training procedure. Specifically, we compared "untrained younger adults" and "trained older adults." Because there were no differences in the performance of young-older adults and older adults (control condition at baseline, $t < 1$; meta-cognitive condition at baseline, $t < 1$; cognitive condition at baseline, $t < 1$), we collapsed the two groups together across all the measures. The two sets of problems assessed during the two sessions were also collapsed together.

The t-tests indicated that trained older adults provided more solutions ($M = 14.46$, $SD = 3.14$) than untrained younger adults in the control group ($M = 11.42$, $SD = 2.5$), $t(43) = 3.40$, $p < .05$, and than trained younger adults in the meta-cognitive group ($M = 12.25$, $SD = 2.38$), $t(42) = 2.44$, $p < .05$.

GENERAL DISCUSSION

This work was guided by a single theme: research on aging can help older people to achieve high levels of performance in everyday problem solving in spite of cognitive declines. The results supported our hypothesis: a brief training procedure enhanced the everyday problem-solving performance of older adults. In both studies, participants who experienced merely a single verbal training session were able to provide more solutions to everyday problems than participants in the control groups. Results suggest that training programs that are less elaborate — and thus more practical — than those employed previously (Ball et al., 2002) may enhance older adults' capacity to generate solutions to everyday problems of living.

Previous studies (e.g., the ACTIVE study; Ball et al., 2002) have demonstrated the necessity of tailored training procedures to enhance everyday problem-solving performance in older adulthood (Berg, Strough, Calderone, Sansone, & Weir, 1998). We believe that our training procedure worked primarily by expanding participants' "everyday problem space." As Simon (1973) argued, the initial state of a problem, goals to be achieved when solving problems, and strategies to be pursued to resolve the problem constitute the "problem space." The problem space is only marginally defined in everyday problems. The training encouraged older adults to go beyond the relatively narrow range of the problem space.

An alternative explanation, that cannot be completely ruled out here, is that Study 1 participants improved their performance as a result of more practice. However, in Study 2, when the training procedures were performed within the experimental and meta-cognitive conditions, results supported the hypothesis that only the tailored training increased everyday problem-solving performance. Participants in the control group did not show improvements in performance a week later. Instead, their overall performance remains almost stable.

An additional explanation of our main results comes from research on personality and social psychology. Social psychologists have demonstrated that brief exposure to procedural knowledge might improve peoples' everyday problem solving (Nisbett et al., 1987). Performance activation processes and knowledge are fostered by exposure to available information (Gilovich, 1981; Higgins, 1996). In our study, when trainers provided elements to broaden the problem space, a greater range of problem-related information came to mind. This available information re-structured people's knowledge about the problem and, in so doing, facilitated solution fluency. It is noteworthy that the information provided was task-specific and idiographically tailored to maximize individual task competence.

Older adults in the experimental group experienced higher levels of self-efficacy that were significantly correlated with levels of performance after training. A possible explanation of these results relies on theories about perceptions of one's ability (Cervone, Artistico, & Berry, 2006). Self-regulated performance, including that on cognitively complex tasks (Cervone, Jiwani, & Wood, 1991), is affected by self-appraisals that occur when people contemplate the tasks and their ongoing achievements. Knowledge that is activated in any given context or via training procedures can shape the content of these appraisals (Cervone, 2004). When a given behavioral challenge is embedded in a context that is relatively familiar to the problem solver, the contextual cues may prime personal knowledge that contributes to higher appraisals of self-efficacy for solving the problem. Conversely, unfamiliar contexts may prime thoughts about one's lack of capability for acting effectively — even if the nature of the behavioral challenge being confronted remains the same. This interpretation is consistent with prior work (e.g., Cervone & Peake, 1986; Gilovich, 1981) documenting the influence of subtle situational cues on self-appraisals, motivation, and performance.

NOTES

1. While working on the manuscript, Daniele Artistico was supported by the NIA (R03AG023271-2) and the PSC-CUNY (600 38-36 37) grants.
2. However, it is possible to think of a subset of everyday problems that could be well defined, such as those concerned with completing a rebate or health care form, in the "Everyday Problems Test" (see Marsiske & Willis, 1995). Well-defined everyday problems are not considered here because they are not open to alternative solutions. The training designed here works only for identifying alternative solutions to ill-defined problems. Means to increase intellectual reasoning and problem solving for well-defined problems are already available in the literature (Ball et al., 2002).
3. Everyday problem solving can also be assessed through the use of structured tests in which individuals select one preferred solution to everyday challenges from among several alternatives (e.g., Diehl et al., 2005; Whitfield, Baker-Thomas, Heyward, Gatto, & Williams, 1999; Whitfield & Wiggins, 2003). This is not consistent with our hypothesis, though, which is specifically aimed to increase solution fluency.

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APPENDIX

Study 1 Problems

Version A

First problem (interpersonal)

An elderly lady has been just released from the hospital after surgery, and because of post-surgical effects she was advised not to do housework. Yet, she keeps doing housework and therefore feels tired. She complains to her husband about her inability to work efficiently; but in so doing, she creates a lot of tension with her husband, especially because he strongly disapproves of her not following medical advice. How could this problem be solved?

Second problem (instrumental/interpersonal)

An elderly person is taking his/her four grandchildren to the movies. The movie theater is about a kilometer away. This person stops a taxi nearby but the taxi driver will not allow five passengers in his car. What could this person do?

Third problem (instrumental/interpersonal)

An elderly person is about to cash his/her pension check at the post-office. After waiting in line for two hours, a post-office employee tells him/her that there is no money left to pay his/her check. This person has leg health problems, and standing in line for two hours has been a real struggle for him/her. What could this person do?

Fourth problem (instrumental)

One elderly couple is going to have some friends over for lunch on Sunday. On Saturday afternoon, their dishwasher breaks down, namely, one of the pipes needs replacing. It is impossible to call for plumbing assistance because on Saturdays and Sundays plumbers are on holiday. Also, in the town this couple lives hardware stores are closed on Saturdays and Sundays. What could this couple do?

Fifth problem (interpersonal)

An elderly person is supposed to visit a friend he/she has not seen for a long time. This friend loves gossiping. The elderly person in question fears that this fellow friend could eventually gossip about him/her with other friends afterwards. What could this person do?

Version B

First problem (interpersonal)

A 64 year-old person unwillingly witnesses an argument between his/her son and his/her son's wife. What could this person do in order to help them?

Second problem (instrumental/interpersonal)

Two friends (both elderly persons) are supposed to meet at 3.30 p.m. to get to the lawyer's office at 4.00: it takes twenty minutes to get there from the "meeting point." At 3:40 one of the two friends has not yet arrived. What could the punctual friend do?

Third problem (instrumental/interpersonal)

An elderly person (77 years old) lives on his/her own. Anytime he/she takes a bath, he/she does not feel comfortable because is terrified that he/she might fall in the bathtub, injuring himself/herself, and being unable to call for help. What could he/she do?

Fourth problem (instrumental)

A widow/widower (67 years old), who lives on his/her own, recently bought a house. Afterward, he/she realized that he/she will not be able to pay his/her monthly bills (mortgage, utilities, etc.) easily. What could this person do?

Fifth problem (interpersonal)

An elderly person (68 years old) has reserved a seat on an Intercity train, but finds that the seat is occupied by a young man who does not speak his/her language. What could this person do?

Study 2 Problems

Version A

First problem (instrumental)

An elderly person is about to cash his/her pension check at the post-office. After waiting in line for two hours, a post-office employee tells him/her that there is no money left to pay his/her check. This person has leg health problems, and standing in line for two hours has been a real struggle for him/her. What could this person do?

Second problem (interpersonal)

An elderly person is supposed to visit a friend he/she has not seen for a long time. This friend loves gossiping. The elderly person in question fears that this fellow friend could eventually gossip about him/her with other friends afterwards. What could this person do?

Third problem (instrumental/interpersonal)

An elderly lady was just released from the hospital after surgery, and because of post-surgical effects she was told not do housework. Yet, she keeps doing housework and therefore feels tired. She complains to her husband about her inability to work efficiently; but in so doing, she creates a lot of tension with her husband, especially because he strongly disapproves of her not following medical advice. How could this problem be solved?

Version B

First problem (instrumental)

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Third problem (instrumental/interpersonal)

An elderly person (77 years old) lives on his/her own. Anytime he/she takes a bath, he/she does not feel comfortable because is terrified that he/she might fall in the bathtub, injuring himself/herself, and being unable to call for help. What could he/she do?

Version C

First problem (instrumental)

An older person is having his/her blood drawn for a test by a very inexperienced physician who, after many attempts, is not able to find a suitable vein in his/her arm. The person experiences much pain as a result. What could this person do?

Second problem (interpersonal)

An older person who lives on his/her own wants to see his/her children and grandchildren more frequently. What could this person do?

Third problem (instrumental/interpersonal)

An older person feels that his/her children are too intrusive of his/her privacy because they frequently ask him/her to baby-sit his/her grandchildren. This situation is quite inconvenient for the person, who has many other issues to deal with during the week. What could this person do?