Compensation Strategies in Older Adults: Association With Cognition and Everyday Function

Sarah Tomaszewski Farias, PhD[1], Maureen Schmitter-Edgecombe, PhD[2], Alyssa Weakley, MS[2], Danielle Harvey, PhD[3], Katherine G. Denny PhD[1], Cheyanne Barba, BA[1], Jason T. Gravano, PhD[1], Tania Giovannetti, PhD[4], and Sherry Willis, PhD[5,6]

Abstract

Background/Rationale: Compensation strategies may contribute to greater resilience among older adults, even in the face of cognitive decline. This study sought to better understand how compensation strategy use among older adults with varying degrees of cognitive impairment impacts everyday functioning. **Methods:** In all, 125 older adults (normal cognition, mild cognitive impairment, dementia) underwent neuropsychological testing, and their informants completed questionnaires regarding everyday compensation and cognitive and functional abilities. **Results:** Cognitively normal and mild cognitive impairment older adults had greater levels of compensation use than those with dementia. Higher levels of neuropsychological functioning were associated with more frequent compensation use. Most importantly, greater frequency of compensation strategy use was associated with higher levels of independence in everyday function, even after accounting for cognition. **Conclusion:** Use of compensation strategies is associated with higher levels of functioning in daily life among older adults. Findings provide strong rational for development of interventions that directly target such strategies.

Keywords

instrumental activities of daily living, mild cognitive impairment, dementia, everyday function, compensation

Introduction

Older adults are a rapidly growing segment of the US population and consequently so are those with cognitive decline. The loss of independence in daily living associated with cognitive decline and diseases such as Alzheimer's disease (AD) result in devastating consequences in terms of reduced quality of life and economic burden.[1] Subtle changes in everyday function begin very early in the disease process (eg, in mild cognitive impairment [MCI] and "pre-MCI") and increase risk for loss of independence/disability.[2] Remaining productive and functionally independent is a major priority for older adults and so it is important to understand what factors contribute to better everyday function. There is considerable heterogeneity in trajectories of everyday function[3] among those with AD and related disorders, wherein some individuals show relative stability over many years and others decline more precipitously. The sources of this variability remain unclear. While cognitive function is a major determinant of functional abilities, this relationship is far from perfect[4] even when examining their longitudinal association.[5] Various factors may contribute to moderating the impact of cognitive impairment on everyday function. One factor that may influence how older adults manage in their daily life is the degree to which they have developed compensatory strategies to help mitigate the impact of cognitive difficulties. However, this has not been previously studied.

The concept of compensation has a long history in the field of rehabilitation.[6] Exact definitions vary, but compensation generally refers to a set of behaviors aimed at mitigating or adapting to loss (either actual or perceived).[7] Compensation

[1] Department of Neurology, School of Medicine, University of California, Davis, CA, USA
[2] Department of Psychology, Washington State University, Pullman, WA, USA
[3] Division of Biostatistics, Department of Public Health Sciences, School of Medicine, University of California, Davis, CA, USA
[4] Department of Psychology, Temple University, Philadelphia, PA, USA
[5] Department of Psychiatry and Behavioral Sciences, University of Washington, Seattle, WA, USA
[6] Department of Radiology, Integrated Brain Imaging Center (IBIC), University of Washington, Seattle, WA

Corresponding Author:
Sarah Tomaszewski Farias, PhD, Department of Neurology, School of Medicine, University of California, 4860 Y Street, Suite 3700, Sacramento, CA 95817, USA.
Email: farias@ucdavis.edu

strategies are generally employed proactively to delay or minimize loss of function and in some cases may also represent an amplification of long-term habits (eg, organizational habits). Among older adults, compensation strategy use may be present in the context of both normal cognitive aging and in response to a progressive neurodegenerative disorder. While data are very limited, previous work suggests that many older adults spontaneously use a variety of compensation strategies.[8] Further, compensation among older adults appears to be a dynamic process; it has been reported to increase with age[9,10] and prior to a diagnosis of MCI, but is less common among individuals with dementia.[11,12]

Various types of cognitively based compensation strategies have been identified in the literature as being used among older adults. Dixon and colleagues, using the Memory Compensation Questionnaire (MCQ),[13,14] have described 5 types of compensation strategies primarily to support memory loss, including external aids (eg, shopping lists), internal aids (eg, mental imagery), recruitment of others for assistance, expenditure of more effort (eg, greater concentration to learn new person's name), and devotion of more time to complete tasks (eg, slowing down reading speed). These types of strategies have since been validated among a variety of older adult samples.[15,16]

Ultimately, the aim of using compensation strategies is to improve a person's ability to function in their daily life. However, few studies have examined the association between reported compensation use and functional outcomes among older adults with or without cognitive impairment/dementia. One exception to this has been the literature examining compensation strategies and medication adherence. Previous studies have shown that older adults often employ a variety of compensation strategies to help them remember to take medications[17] with external strategies (eg, keeping medications in a visible location) among the most common strategies.[18] Further, the use of multiple strategies may be more advantageous than a single strategy.[19] In sum, there is emerging evidence, albeit limited, that use of compensation strategies enhances older adults' ability to function in daily life.

One hindrance to research in this area has been the lack of instruments that are available to measure compensation with good breadth of assessment and direct relevance to everyday function. For example, the MCQ[13,14] assesses primarily memory-based compensation strategies but does not extensively cover strategies that rely on enhanced planning, organization, or self-monitoring. Additionally, the MCQ was developed over a decade ago and does not include strategies that take advantage of newer technology. Finally, given the importance of understanding the association between compensation use and functional independence, it is important that the compensation strategies be grounded in major activities of daily living that are critical for autonomous function. More recently, the Instrumental Activities of Daily Living-Compensation Scale (IADL-C) was developed to capture support provided by compensatory strategy use when completing everyday activities.[12] However, the types of compensation strategies used in everyday life is not directly assessed.

The purpose of the present study was to begin to better understand how compensation strategies that are being used among older adults with varying degrees of cognitive impairment impact everyday function. A new questionnaire comprehensively measuring compensation strategy use within the context of completing activities of daily living critical for independence was administered to the informants of older adults with and without cognitive impairment. We examined how diagnosis and neuropsychological function relates to compensation use and the degree to which compensation is associated with everyday function. We hypothesized that compensation strategy use would be highest in those with mild problems (eg, MCI), due to increased need for compensation as well as relatively intact cognitive abilities to use and persist in such strategies. We also hypothesized higher frequency of compensatory strategy use would predict a better level of everyday functioning, independent of cognitive ability.

Methods

Participants

Participants in this study were part of a longitudinal research cohort at the University of California, Davis Alzheimer's Disease Center, which has been described elsewhere.[20,21] Exclusion criteria included an unstable major medical illness, a severe/debilitating psychiatric disorder (milder forms of depression were acceptable), another existing neurologic condition outside of the target diseases (eg, AD and related disorders and cerebrovascular disease), and active alcohol or drug abuse/dependence. All participants received annual multidisciplinary clinical evaluations that included a physical and neurological examination, imaging, lab work, and neuropsychological testing from the Alzheimer's Disease Uniform Dataset Neuropsychological Battery.[22] For participants in this study, diagnosis was categorized as normal cognition, MCI, or dementia. The diagnosis of MCI was made according to standard clinical criteria using the current Alzheimer's Disease Centers Uniform Data Set guidelines.[23] Dementia was diagnosed using the criteria outlined in the *Diagnostic and Statistical Manual for Mental Disorders*–Third Edition–Revised.[24] Neuropsychological tests used to make a clinical diagnosis were separate from the neuropsychological tests used as variables in the current study. Additionally, for clinical diagnostic purposes, everyday function was assessed using a variety of standardized tests and a clinical interview with the participant and informant. Clinical diagnoses were made completely independent of the Everyday Cognition (ECog) scale[21,25,26] and IADL instruments used in the current study. All participants provided written informed consent, and all human participant involvement was approved by institutional review boards at University of California at Davis, the Department of Veterans Affairs Northern California Health Care System and San Joaquin General Hospital in Stockton, California.

Measurements

Compensation in everyday life. The goals of developing the Everyday compensation (EComp) Questionnaire were 2-fold. First, we sought to comprehensively assess cognitive and behaviorally based compensation strategies that support both everyday memory and everyday executive abilities (eg, strategies that rely on enhanced organization, planning, prioritization, self-monitoring, and use of routines). Where relevant, we also included compensation strategies that utilize technology-based aids. A second goal was to measure compensation strategies that are used explicitly in the context of completing common activities of daily living that are critical to independent living. An initial pool of items reflecting various compensation strategies was generated by surveying existing instruments. To identify additional compensation strategies, experts in cognitive aging, everyday function, and cognitive rehabilitation (Farias, Willis, Schmitter-Edgecombe, and Giovannetti) generated additional items. A total of 70 items were included and covered 6 general areas of everyday living: 12 items relate to managing appointments, 13 items relate to shopping, 17 items relate to cooking, 10 items relate to managing finances, 12 items relate to transportation, and 6 items relate to managing medications (see Table 1 for sample items). The questionnaire was completed by an individual who had regular contact with the study participant. Use of a collateral informant was preferred to avoid potential biases in reporting associated with lack of insight, particularly in individuals with dementia. Informants rated the frequency with which the participant utilized each compensation strategy on a 5-point scale: 0 = never, 1 = rarely, 2 = sometimes, 3 = frequently, 4 = always. A response choice indicating that the rater "could not say" was also included. For this reason and to account for missing values, an average was calculated for each domain (the sum of items completed, divided by the number of items completed) to use in statistical analysis. Total score was the average of all items. Possible range = 0 to 4. At least half of the items had to be completed to calculate a total score. Internal consistency across all items of the EComp is high (Cronbach α = .94).

Neuropsychological Function

Neuropsychological functioning was assessed using the Spanish and English Neuropsychological Assessment Scales battery (SENAS). The SENAS has undergone extensive development as a battery of neuropsychological tests relevant to diseases of aging.[27,28] Psychometric methods based on item response theory were used to create psychometrically matched measures across different scales.[27] This study used 2 composite indices from the SENAS: episodic memory and executive function. The Episodic Memory Index is a composite score derived from a multitrial word list-learning test (Word List Learning I). The Executive Function Index is a composite measure constructed from component tasks of category fluency, phonemic (letter) fluency, and working memory. These measures do not have appreciable floor or ceiling effects for participants in this

Table 1. The Everyday Compensation (EComp) Questionnaire—Example Items.

Managing appointments
    Routinely write appointments on a calendar.
    Set alarm as reminder about appointment.
    Keep a calendar in a prominent place in the house so you will see and refer to it frequently.
    Prepare ahead by gathering items that need to be brought to appointment.
Shopping
    Use a written shopping list.
    Shop during off hours when store is less crowded to cut down on distractions.
    Plan out ahead of time the sequence of stops one wants to make when going to multiple stores.
Cooking
    Stay in the kitchen when cooking so as not to forget about something on the stove.
    Limit other distractions in the kitchen while cooking (not having television/radio on).
    Set out ingredients/supplies ahead of time.
Managing finances
    Have a routine to pay bills on a certain time each month.
    Put bills in a specific location until they get paid to help keep track of them.
    Double check work to make sure bills have been paid correctly.
    Utilize online and/or automatic payment methods as a way to remember to pay bills.
Transportation
    Use a Global Positioning System (GPS) device in the car or on phone to help remember a route.
    Restricts driving only to well-known routes or a few specific locations.
    Always park in the same general location in a parking lot.
    Leave earlier to allow for more time.
    Keep car keys in a specific location so as not to lose them.
Managing medications
    Set an alarm as a reminder to take medications.
    Rely on another activity as a reminder to take medications (eg, with meal).
    Keep medication in a visible location (eg, on the kitchen counter).

sample and have linear measurement properties across a broad ability range. The SENAS indices are psychometrically matched measures of domain-specific neuropsychological abilities (ie, the indices have comparable reliability and sensitivity to individual differences). The SENAS development and validation are described in detail elsewhere.[27,28]

Assessment of Everyday Functional Limitations

Degree of functional limitation was measured using the ECog scale.[21,25,26] The ECog is a 39-item informant-based questionnaire. It was designed specifically to be sensitive to mild functional limitations that predate the loss of independence and has been shown to be relevant to functional changes associated with MCI.[25,26] The ECog items cover 6 cognitively relevant domains (everyday memory, everyday language, everyday spatial abilities, everyday planning, everyday organization, and

everyday divided attention) from which domain scores can be generated in addition to a total summary score. On each item of the ECog scale, informants were asked to assess the participant's current level of everyday functioning in comparison to how he or she functioned 10 years earlier. In this way, individuals served as their own control. Each item on the ECog is rated on a 4-point scale: 1 = better or no change compared to 10 years earlier, 2 = questionable/occasionally worse, 3 = consistently a little worse, and 4 = consistently much worse. For the purposes of the current study, a total summary score was used (ECog total). Scores were calculated by summing items and dividing by the number of items completed, which allows for some missing or nonanswered items (at least half of the items need to be completed to calculate a score). Thus, the total score may range from 0 to 4, with higher scores indicating more severe functional limitations. Previous confirmatory factor analysis supports use of both a global score and domain-specific scores.[26] Literature on the ECog has also shown evidence of content, convergent and discriminant, and external validity.[21,26]

Assessment of IADLs

Assessment of IADLs was based on the Lawton and Brody scale which is a widely used informant-based measure used to rate participants' abilities across 8 activities, including the ability to use a telephone, shop, prepare food, complete housework, do laundry, utilize public transportation, administer medication, and handle financial responsibilities.[29] Each item was rated as follows: 0 = can complete the task independently, 1 = the task requires some assistance, 2 = the task must now be completed by someone else. Level of IADL independence was measured via a summary total score (eg, the average rating across the items that were rated; if fewer than half of the items were rated, the total score was missing). The possible total score ranged from 0 to 2, with higher scores reflecting greater dependence on caregivers.

Data Analysis

Means and standard deviations (SDs) for continuous variables and frequencies for categorical variables were computed by diagnostic group. Analysis of variance was used to compare compensation use between diagnostic groups; if an overall group difference was observed, post hoc pairwise comparisons adjusted for multiple comparisons using the Tukey-Kramer adjustment for unbalanced designs.[30] Pearson correlations were estimated between compensation use and neuropsychological domains and mean IADL rating, while Spearman correlations were estimated between compensation use and functional abilities measured by the ECog and the number of dependent IADL items. Linear regression was used to evaluate the association between compensation use and demographics, neuropsychological function and mean IADL rating. Tobit regression with a lower bound of zero was used to assess the association between compensation use and the ECog total because of the restricted range of the ECog scores (1-4, log (ECog) : 0, log (4))

Table 2. Participant Characteristics.[a,b]

	Cognitively Normal, n = 68	MCI, n = 31	Demented, n = 23
Age	79.7 (6.1)	82.4 (7.2)	79.5 (9.2)
Education	14.0 (3.7)	14.2 (4.5)	14.8 (3.0)
Female, n (%)	43 (63.2)	10 (32.3)	10 (43.4)
Ethnicity, n (%)			
African American	13 (19.1)	5 (16.1)	2 (8.7)
Caucasian	31 (45.6)	20 (64.5)	15 (65.2)
Hispanic	20 (29.4)	4 (12.9)	3 (13.0)
Other	4 (5.9)	2 (6.4)	3 (13.0)
Neuropsychological function			
Episodic memory	0.3 (0.8)	−0.8 (0.6)	−1.5 (0.8)
Executive function	0.02 (0.6)	−0.5 (0.5)	−1.0 (0.7)
Semantic memory	0.8 (0.9)	0.5 (1.1)	−0.3 (1.0)
Spatial abilities	0.2 (0.8)	−0.1 (0.8)	−1.1 (1.3)
Everyday functional limitations			
ECog total score	1.6 (0.6)	1.9 (0.8)	3.0 (0.6)
IADL independence total	0.2 (0.4)	0.4 (0.3)	1.4 (0.5)
Total compensation	1.7 (0.5)	1.6 (0.6)	1.0 (0.8)

Abbreviations: ECog, everyday cognition; IADL, instrumental activities of daily living; MCI, mild cognitive impairment.
[a]Means and standard deviations presented unless otherwise stated.
[b]Neuropsychological scores are expressed as z scores with a mean of 0 and standard deviation of 1. ECog and Compensation scores are expressed as averages. Other scores are raw scores or otherwise indicated.

and the high frequency of ratings near 1 (0 on the log scale). All analyses were conducted using SAS version 9.4 and a *P* value <.05 was considered statistically significant.

Results

The sample consisted of 123 older adults; 68 were determined to have normal cognition, 31 were diagnosed with MCI, and 23 with dementia. Participants were on average 80.5 years old (*SD* = 7.1) and had an average of 14.3 years (*SD* = 3.8) of education. Females represented 52.0% of the sample. The sample represents a diverse racial/ethnicity background and the breakdown was as follows: 54.4% Caucasians, 16.8% African Americans, 21.6% Hispanics, 4.8% Asians, and 2.4% other/unknown. The majority of informants were either the spouse (52.8%) or the adult child (29.6%). Informants spent an average of 90.4 (*SD* = 71.6) hours per week with the participant. Table 2 presents baseline demographic information by diagnostic group as well as average compensation scores, neuropsychological scores, and functional scores on the ECog and IADL measure. In the sample as a whole, compensation use was not associated with age (*r* = 0.03, *P* = .76), education (*r* = −0.05, *P* = .57), or gender (*t* = −.96, *P* = .34).

Compensation Use by Diagnosis

We first examined how frequency of compensation use varied across the 3 diagnostic groups. As anticipated, both older adults
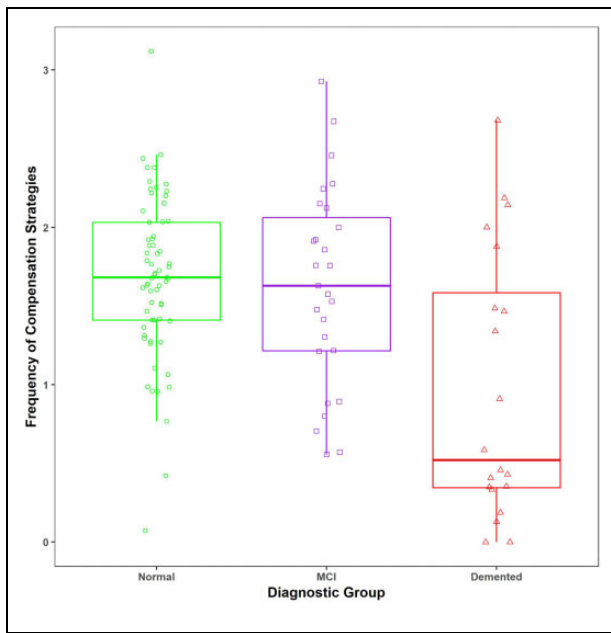
Figure 1. Box and whisker plot of compensation score by diagnostic group (normal, mild cognitive impairment, demented).

with normal cognition ($P < .001$, mean = 1.7, $SD = 0.5$) and those with MCI ($P = .001$, mean = 1.6, $SD = 0.6$) were rated as using compensation strategies more often than individuals with dementia (mean = 1.0, $SD = 0.8$; see Figure 1).

Association Between Compensation and Neuropsychological Function

We next examined the degree to which compensation use was associated with cognitive function across 2 neuropsychological domains (episodic memory and executive functioning). Results indicate that more frequent compensation use was associated with both stronger episodic memory ($r = .31$, $P < .001$) and better executive functioning ($r = .26$, $P = .004$).

Association Between Compensation and Everyday Function

The primary aim of the study was to examine whether compensation was associated with how well older adults were performing everyday tasks in their daily lives. We first examined the association between compensation and everyday function as measured by the ECog scale. Results demonstrate that greater frequency of compensation was associated with fewer functional limitations ($r = -.34$, $P < .001$). Next, we examined whether compensation predicted better functional abilities independent of an individual's level of cognitive function. That is, regardless of degree of cognitive impairment, does compensation strategy use make an independent contribution to how well older adults are functioning in their daily lives? In a joint model that included compensation, executive function, and episodic memory (along with age, education, and gender) both

more frequent compensation use ($\beta = -.23$, standard error [(SE] = .06, $P < .001$) and better episodic memory ($\beta = -.15$, $SE = .05$, $P < .001$) independently predicted a higher level of everyday function (eg, less functional limitations) as measured by the ECog.

Finally, we also examined whether compensation was associated with degree of independence in IADLs in the subset of 81 individuals who had an IADL assessment (measurement of IADLs was missing at random). Greater compensation was associated with a higher level of independent function in IADLs ($r = -.48$, $P < .001$). When compensation use was included in a joint model predicting IADL total score, along with the neuropsychological memory and executive composites (and age, education, and gender), greater compensation use ($\beta = -.35$, $SE = .09$, $P < .001$) and better episodic memory ($\beta = -.23$, $SE = .07$, $P = .002$) were independently associated with a higher level of independent function in IADLs. To address missingness, we imputed IADL values from recent IADL assessments, which left us with only 19 individuals without IADL data. When we reran the analysis including the imputed data, results remained unchanged. Greater compensation use ($\beta = -0.32$, $SE = 0.08$, $P < .001$) and better episodic memory ($\beta = -.23$, $SE = 0.06$, $P < .001$) were associated with a higher level of independent function in IADLs.

Discussion

The most important and unique finding of the present study is that greater frequency of compensation strategy use in everyday life, as observed by a knowledgeable informant, was associated with a higher level of everyday function. Further, while better cognitive function (eg, higher performance on neuropsychological measures of episodic memory and executive function) was also associated with more frequent use of compensation strategies, the association between compensation and everyday function remained statistically significant even after accounting for cognition. This suggests that regardless of degree of cognitive impairment, the more an individual is using compensation strategies in their daily life, the higher their level of functional independence.

In this study, we used 2 measures of everyday function (the ECog and the Lawton and Brody IADL instrument); while these 2 measures are correlated, conceptually they measure different aspects of everyday function. The ECog was designed to measure very early and subtle changes in everyday function that are highly dependent on specific cognitive functions.[26] The functional limitations measured by the ECog have been shown to predate loss of independence in IADLs.[2] In the current study, we show that greater compensation use is associated both with fewer functional limitations on the ECog and a higher level of independence in IADLs. Given that remaining independent in IADLs is critical to maintaining autonomy and remaining in the home, this is a very important finding. Findings suggest that even when older adults exhibit cognitive impairment, the more they implement compensatory strategies in their daily lives, the more functionally independent they remain.

With regard to neuropsychological function and compensation, not surprisingly we found that both stronger episodic memory and executive function were associated with better compensation. Similarly, although there was quite a bit of interindividual variability in compensation use even within the diagnostic groups (see Figure 1), as a whole, degree of compensation did significantly differ by diagnostic status. Individuals with normal cognition or MCI were rated as using compensation strategies in their daily life more frequently than older adults with dementia. Such findings are not surprising and suggest that as degree of cognitive impairment increases older adults become less able to implement strategies or recognize the need for such strategies to help overcome their cognitive deficits. These findings are consistent with other literature that shows compensation decreases with dementia.[11]

Interestingly, compensation use did not significantly differ among cognitively normal older adults versus those with MCI. This may suggest, first that older adults with normal cognition employ a variety of strategies to help them function effectively and efficiently when completing various tasks of everyday living.[31] It also provides some evidence to suggest that even among older adults with cognitive impairment, and potentially the early stages of a neurodegenerative disease, the use of compensation strategies to support better function is possible. Such findings are somewhat different from those reported by Schmitter-Edgecombe who found that strategy use was higher in those with MCI as compared to older adults with normal cognition.[12] In the Schmitter-Edgecombe study, endorsement of compensatory strategy use to support common everyday activities is part of the IADL-C questionnaire on which older adults are rated on their overall independence in daily activities with or without use of a compensatory aid, which may obscure findings specifically related to the frequency of their compensation strategy use, thus more research is needed.

This study has important clinical implications. The finding that better compensation is associated with a higher level of functional independence provides strong rational for the development of interventions aimed at further enhancing the use of compensation strategies in daily life. While many interventions have the downstream goal of enhancing everyday function (most often through indirectly enhancing cognitive function), this study suggests that because compensation has an effect on functional abilities independent of cognition, direct training in compensation should yield a benefit in everyday function that is not attributable to improving cognition. Previous interventions that explicitly and directly target compensation training among older adults have been very limited. Interventions teaching various memory-based compensation strategies have demonstrated that older adults, including those with MCI, can increase their use and knowledge of compensatory strategies as a result of focused training.[32,33] A study by Greenaway trained older adults with MCI to use a memory support system that included a combined calendar and journal system and demonstrated informant-rated improvements in everyday memory abilities as a function of the intervention.[34] Similarly, an intervention designed to facilitate adoption of newly learned cognitive compensatory strategies (centered on a memory notebook) among individuals with MCI found modest practical everyday benefits.[35]

Our previous work suggests that decrements in everyday executive functions, in addition to everyday memory, are particularly strongly linked to the loss of independence in IADLs.[2] As such, interventions that provide training in compensation strategies specifically targeting the support of everyday executive abilities may produce an even stronger impact on helping older adults to maintain their independence and slow functional loses. Interventions aimed at enhancing everyday executive functions have been developed for other clinical populations, most notably for adults with attention-deficit/hyperactivity disorder and have demonstrated improvements in a variety of real-world outcomes.[36] A few intervention programs have focused on enhancing everyday executive function skills among older adults, such as the Goal Management Training,[37] but have been limited in their assessment of functional outcomes. Recently, we have developed a program aimed at teaching compensatory strategies that focuses on 3 interrelated areas: calendar use, goal setting and use of task lists, and the implementation of organizational systems within the personal environment. Initial pilot testing has suggested it results in increases in some of the compensation strategies examined in the current study.[38,39]

As with all studies, there are a number of strengths as well as limitations which will require further study. The sample of participants in the study was unusually diverse in terms of ethnic/racial background. The measurement of compensation was based on informant report. Informant report is subject to a variety of biases[40,41] and particularly important, outside observers may not recognize all of the strategies that an individual is initiating in order to compensate. It therefore may be useful in the future to investigate self-report measures of strategy use (despite known limitations), particularly to assess use of strategies that are implemented internally (eg, mnemonics). Further, while we developed a large variety of compensatory strategies based on clinical and research expertise to create the EComp questionnaire, directly surveying a sample of older adults as to which methods they use, and how helpful they find each method, may help to fill in potential gaps in strategy use. An important avenue for future work will be to formally evaluate how reported compensation use relates to observational-based ratings of compensation, which are likely less prone to biases. We are also interested in examining, in a larger sample, whether there is empirical evidence of different types of compensation when subjecting the EComp to factor analysis. If separable types of compensation are identified, the next step will be to determine whether there are differential relationships with functional outcomes. Exploratory analysis (data not shown) suggested that when compensation strategies were divided on a conceptual/theoretical basis into strategies to assist everyday memory (eg, use of external memory aids such as using a calendar or shopping list) versus strategies that may support everyday executive abilities (eg, strategies such as relying on routine or enhanced behavioral monitoring such as spending more time or double checking one's work), memory-based compensation strategies were associated with

less severe early functional limitations, while executive-based compensation strategies were associated with less IADL dependence. Finally, a better understanding of which intrinsic factors or intrapersonal characteristics promote better compensation is important. While we did not find years of education to be significantly associated with degree of compensation, other studies have reported small associations with education.[42] There are a number of other factors that may make the use of compensation more or less likely, including personality characteristics. For example, it has been previously demonstrated that higher levels of the personality trait "conscientiousness" is associated with lower risk of dementia[43] and disability.[44,45] It may be that individuals with higher levels of conscientiousness are more likely to employ compensation strategies and hence less likely to manifest functional disability and meet criteria for dementia. Older adults' perceptions of their memory abilities may also play a role in strategy use. For example, a recent study found memory self-efficacy mediated the association between objective memory performance and compensation strategy use.[46] Finally, prospective longitudinal studies will be important to evaluate the degree to which greater compensation impacts rates of functional decline and whether it ultimate delays diagnostic progression (eg, incident MCI or dementia).

In summary, maintenance of functional autonomy and independence are of high priority to older adults. As such, it is important to better understand the factors that contribute to greater functional resilience and to use that knowledge to develop interventions that enhance and support those factors. Currently, we have limited understanding of the frequency with which older adults engage in various methods of compensation and how it affects functional outcomes. This is the first study, of which we are aware, to demonstrate that greater spontaneous compensation strategy use is associated with a higher level of everyday function independence in IADLs and is therefore an important step forward.

Declaration of Conflicting Interests

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