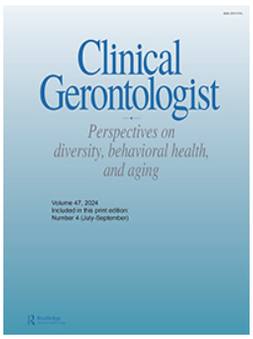

Clinical Gerontologist

ISSN: (Print) (Online) Journal homepage: www.tandfonline.com/journals/wcli20

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**To cite this article:** Peter A. Lichtenberg, Vanessa Rorai, Emily V. Flores & Wassim Tarraf (02 May 2024): The WALLET Study: Financial Decision Making and Key Financial Behaviors Associated with Excess Spending, Clinical Gerontologist, DOI: 10.1080/07317115.2024.2348049

**To link to this article:** https://doi.org/10.1080/07317115.2024.2348049

CLINICAL GERONTOLOGIST
https://doi.org/10.1080/07317115.2024.2348049

Routledge
Taylor & Francis Group



# The WALLET Study: Financial Decision Making and Key Financial Behaviors Associated with Excess Spending

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**ABSTRACT**

**Objectives:** The Wealth Accumulation and Losses in Later life Early Cognitive Transitions (WALLET) study data was used to examine correlates with excess spending in older adults who do and do not have early memory loss.

**Methods:** The WALLET study collected detailed financial information from participants' primary checking account statements ($n = 150$). Information on participant sociodemographic, health, and disability status, memory functioning, financial decision-making, and financial literacy was also collected. Participants either had no memory problems or early memory loss. Bivariate and multiple regression analyses were conducted.

**Results:** The early memory loss group had significantly higher excess spending than those with no memory loss. Financial decision-making and higher-risk financial behaviors were also linked to higher excess spending. Early memory loss was no longer statistically significant after accounting for financial stressors and resources.

**Conclusions:** The multidimensional nature of financial capacity assessment has long been known. The WALLET study data is unique, however, in that it demonstrates the links between excess spending with decision-making, early memory loss, and a set of specific financial behaviors.

**Clinical Implications:** Real-world assessments of financial management and financial decision-making yield important information about how older adults are managing money and making key financial decisions. Checking account reviews can be used to determine excess spending.

**ARTICLE HISTORY**
Received Date 18 January 2024
Revised Date 20 April 2024
Accepted Date 22 April 2024

**Keywords**
Financial capacity; financial decision-making; early memory loss

## Introduction

The assessment of financial capacity is an increasingly important practice in the work of clinical gerontologists (Marson, 2016). Marson (2016) reviewed the importance of retaining financial capacity in older ages, and the conceptual models used in the assessment of financial capacity. He discussed three approaches that underlie assessment tools: (1) the clinical model, which assesses financial skills relevant to independence; (2) the decision-making model based on Appelbaum and Grisso's (1988) decision-making capacity approach; and (3) financial capacity as financial function in the real-world model proposed by the National Academies of Sciences, Engineering, and Medicine (2016). The Wealth Accumulation and Losses in Later life Early Cognitive Transitions (WALLET) study recently demonstrated the feasibility of a method to measure spending using actual checking account statements of older adults (Lichtenberg et al., 2022). In this study, we used WALLET data to examine the association between early memory loss, financial decision-making, and financial behaviors with a measure of excess spending.

In Figure 1 the conceptual framework used to guide this study is illustrated. This framework was created by us as we began to envision the study. The framework posits that sociodemographic measures, and functional and cognitive measures are related to financial stressors/resources including numeracy, financial literacy, financial decision-making, and key financial behaviors. Each financial measure has the potential of being either a strength or

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Supplemental data for this article can be accessed online at https://doi.org/10.1080/07317115.2024.2348049

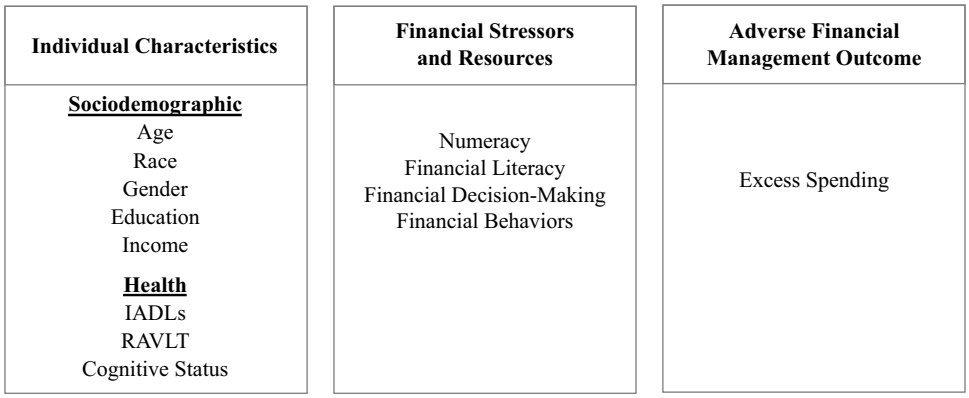


**Figure 1.** Conceptual framework.

a stressor. These financial stressors/resources measures are in turn related to excess spending, an adverse financial management outcome. The ability to manage one's finances is one aspect of financial capacity.

Cohen, Sepehry, and Schultz (2020) and Ghesquiere et al. (2019) reviewed 13 clinical assessment tools for measuring aspects of financial capacity and underscored the need for improved practice guidelines in the clinical assessment of financial capacity. Cohen, Sepehry and Schultz (2020) noted four challenges to financial capacity assessment: First, the variability of intra-individual capacities – that is, there is often variability within different domains of financial capacity (e.g., decision-making vs. performance). Second, the field currently relies too heavily on cognitive screening measures. Third, serious questions persist regarding the ecological validity of cognitive tests and their relation to capacity outcomes. Fourth, outcomes are inconsistent due to a lack of standardized assessment approaches. While it is critically important that we increase the reliability of assessments, it must always be recognized that capacity consists of multiple areas of assessment and is, in the end, a clinical judgment based on the clinical gerontologist's (and psychologists' in general) education, expertise, and experience.

Most of the 13 assessment tools reviewed assess financial performance using neutral stimuli or, in the case of financial decision-making, vignettes or semi-structured interviews (see the articles for a complete review of the assessment tools). However, two tools – the Lichtenberg Financial Decision Rating Scale (LFDRS) (Lichtenberg et al., 2015), and the Timeline Historical Review of Income and Financial Transactions (THRIFT) (Black et al. 2013) – are based on the person's actual financial situation.

The THRIFT is a self-report instrument. The LFDRS, on the other hand, has a rating scale component that incorporates Appelbaum and Grisso's (1988) decision-making model (which is common to all decision-making assessment tools) and also a self-report component to assess the context of the person's own situation regarding finances (e.g., financial strain, confidence, anxiety about money, relationship strain with respect to finances). The LFDRS is also a multiple-choice instrument that provides a financial vulnerability/financial risk score. Lichtenberg et al. (2022) demonstrated the feasibility of real-world financial performance assessment, and Lichtenberg (2023) demonstrated how this approach could be used in a case of financial capacity assessment (e.g., conservatorship). Furthermore, the feasibility study revealed that real-world decision-making assessment (the LFDRS) was a significant predictor of excess spending in the sample, compared with a measure of financial literacy. In this study, we examine the association of financial decision-making and financial management behaviors with spending outcomes that reflect the daily management of finances in a cognitively mixed sample.

Given the aging US population and increasing rates of cognitive impairment and decline, more empirical research has focused on understanding the relationships between cognitive health and wealth maintenance in later life. Mazzona and Peracchi (2018) used 9 waves of data from the

Health and Retirement Survey (1998–2014) and found that older adults with cognitive decline were more likely to experience financial losses. These losses appeared to be linked to financial decision-making regarding investment income and, secondarily, a decline in savings. However, such losses were mainly concentrated among those with significant assets.

Other work using the Health and Retirement Study (HRS) has also highlighted the risk of wealth loss during early cognitive impairment. For example, Hsu and Willis (2013) found that declines in financial management skills (e.g., bill paying) were largely related to an older person's cognitive skills, and Angrisani and Lee (2018) examined the relationship between cognitive loss and private wealth loss using the HRS. Their data showed that significant memory loss across a 4-year period was associated with an average wealth loss of more than $30,000 compared with those who were non-impaired. More recently, using Medicare claims data across a 19-year period, Nicholas, Langa, Bynum, and Hsu (2021) reported that subprime credit scores and missed bill payments increased significantly shortly after a diagnosis of Alzheimer's disease. These wealth loss studies describe the association between significant memory loss and wealth loss, as well as increased risk for changes in subprime credit scores.

Despite the important evidence provided by this work, studies have yet to focus on measures that reflect the realistic daily financial management: The literature offers only scant information on how financial decision-making and financial management behaviors impact expenditures or wealth loss. Two primary aspects of financial management are financial literacy and financial decision-making (Hall et al., 2022). Because early memory decline can adversely impact personal wealth, and because this decline is often undetected by a health professional (Angrisani & Lee, 2018), it is critical that we investigate personal finance and spending across a continuum of decline from no memory problems to perceived cognitive impairment (PCI) to Mild Cognitive Impairment (MCI). This study examines how early memory impairment (perceived or diagnosed) is related to excess spending.

A PCI measure was established by the Centers for Disease Control and Prevention (CDC) to investigate population-based issues and coordinate with each state's Behavioral Risk Factor Surveillance Survey, and a study of over 220,000 respondents demonstrated the importance of PCI for a variety of health outcomes (Taylor et al., 2020). PCI-affirmative respondents had significantly increased chronic health conditions and a high risk of developing dementia – yet less than half had discussed their cognitive concerns with a healthcare professional. The importance of including those with PCI is underscored by recent neuroimaging studies. PCI (aka subjective cognitive decline) was found to produce no neuropsychological test differences compared with those with no complaints, but more white matter hyperintensities were observed in the PCI group than in the no-complaints group (van Rooden et al., 2018). Finally, Viviano and Damoiseaux (2020) provided a review of perceived cognitive decline and noted that it is a risk factor for the development of Alzheimer's disease.

## Purpose of the study

This study aims to examine the relationships between measures highlighted in our conceptual framework with excess spending in a sample of community older adults. The WALLET study used 12 months of participant's checking account statements followed by an in-depth analysis by the first author and an interview with the participant. We tested the following hypotheses using the conceptual framework included in Figure 1:

**Hypothesis 1:** Participants with early memory loss will have significantly more excess spending than those with no memory loss.

**Hypothesis 2:** The LFDRS will be associated with excess spending above and beyond the effects of financial literacy, numeracy, sociodemographic, and functional measures.

**Hypothesis 3: A** new Financial Vulnerability Index (FVI) generated by a personal finance expert (see Lichtenberg et al. 2022) and documented through a review of the accounts and interviews

will be associated with excess spending above and beyond all other measures.

## Methods

### Data

We use data collected from WALLET study participants from the metro Detroit area (ages 59 to 96; 80% female). We conducted 150 interviews with participants who met the study criteria: normal cognition ($n = 67$), PCI ($n = 63$), and MCI ($n = 20$). Briefly, the interviewers administered several standardized measures and collected detailed financial information from participants' primary checking account statements. Survey questionnaires were used to obtain detailed sociodemographic, health, and disability status information. The WALLET study also collected cognitive data to assess memory functioning. Participants completed several financial scales to assess financial decision-making, specific financial behaviors, financial numeracy, and financial literacy.

### Procedure for recruitment

Given the heterogeneity of older adults, we focused our recruitment on adults ages 60 and over and had one 59 ½ year old participant. Participants ranged from ages 59 to 96, were primarily responsible for a personal checking account, and were English speakers. Participants were recruited from research registries through the Michigan Alzheimer's Disease Research Center (MADRC) ($n = 51$) and the Wayne State University Institute of Gerontology Healthier Black Elders Center ($n = 53$). Participants were also recruited via newsletters or informational lectures given by the first author ($n = 32$) and word of mouth from WALLET participants ($n = 14$). Of those who expressed interest in the study, approximately 85% completed the study. Dropout was due to the time demands of gathering checking account statements. Prospective participants were prescreened to determine eligibility based on the following criteria: age 59 ½ or older and no diagnosis within the last 2 years of epilepsy, stroke, traumatic brain injury, bipolar disorder, schizophrenia, or significant use of drugs or alcohol.

The study coordinator arranged with each participant to obtain copies of their main checking account statements for 12 consecutive months within the previous 2 years. Hard copies were either mailed or hand delivered and electronic copies were emailed. All statements were de-identified and assigned a random ID number. Participants then completed a telephone interview about their finances. All participants were compensated for their participation and reimbursed for study-associated banking or mailing fees, if any. The study was approved by the Wayne State University IRB.

### Measures

#### Analyzing checking account statements

The procedures below were used to identify income from all sources, planned budgets, and expenditures, which were integrated with information obtained through the in-depth financial interview.

(1) Establish that the participant is the primary manager of the checking account.
(2) Establish regular monthly/annual income; this may include multiple sources of income, such as Social Security, pensions, IRAs with a required minimum distribution, annuities, or other investment accounts. Also, establish whether there are regular payments into a savings or investment account so that these will not be counted as expenditures. Some of these income sources are easily identifiable; others must be probed and confirmed during the interview with the participant. Discuss whether the total income is equal to the budget goals for the participant.
(3) Document and/or calculate monthly inflows and outflows to the checking account. Outflows will be used to determine annual expenditures, and thus verifying such transactions during the interview is crucial.

These steps determine the measurement of total income, total budget, and total expenditures, which are used to calculate the excess spending

percentage (details for this are provided in the measures section).

### Financial vulnerability index (FVI)

The FVI was created to provide a brief risk inventory of financial behaviors associated with excess spending. As described in the feasibility study (Lichtenberg et al., 2022) a personal finance expert guided the potential items for this measure. Based on the feasibility study, four financial behaviors/incidents were used to make up the Financial Vulnerability Index (FVI) score.

(1) Late fees: For insufficient funds, as reported on bank statements.
(2) Overspending: To identify potential excess expenditures in a category (i.e., at least double the proportion of income across the 12 months as would be appropriate), examine expense categories: phone, television/computer, insurance, water, gas, electricity, charitable contributions, online shopping, etc.
(3) Helping others on a regular basis: This is determined by interview but should be linked to expenses. Probe for who is being helped and how much is being expended by self-report and compare with checking account totals. Helping others included monthly assistance to children and/or grandchildren or payment of large bills on behalf of children or grandchildren on a regular basis such as tuition.
(4) Financial exploitation: Probe to determine whether the participant was financially exploited and lost money during the 12 months of the checking statements and had the participants describe the loss, including the type of loss and how much was lost. All reported exploitation were scam victims. Only those who lost money are included in this category. The final determination of financial exploitation is the result of a consensus conference with a psychologist and social worker. The consensus conference reviewed the self-report of a scam with any checking account evidence for the scam and decided whether exploitation occurred.

The correlation among these four indicators was low to moderate (not exceeding 0.32) as such suggesting, as intended, that the individual items are tapping into varied sources of financial vulnerability with higher values measuring higher vulnerability across sources.

### Excess spending

Excess spending, measured as a percentage, was the primary outcome of interest. We defined excess spending as expenditures beyond income. Income included Social Security, pensions, tax refunds, work income, and any planned distributions from an IRA or investment account. We confirmed that this represented the amount of money individuals had budgeted to spend during the year. Excess spending was determined by subtracting the sum of the 12-month expenditures (from the checking account) from the total income. Negative values were categorized as excess spending. For individuals who satisfied the excess spending criteria, we calculated the loss value to the annual percentage of loss beyond income by dividing the loss value by the annual income. For example, if a participant expended $10,000 beyond an income base of $100,000, the loss would be 10%. Interviews were used to confirm the income figures.

### Cognitive status: early memory decline

We combine participants with MCI or PCI into one group and compare them to a no memory loss group. Participants with MCI were obtained through the Michigan Alzheimer's Disease Research Center, which uses a consensus diagnosis conference process and nationally agreed on procedures and definitions for diagnosing MCI. A PCI measure was established by the CDC to investigate population-based issues and coordinate with each state's Behavioral Risk Factor Surveillance Survey (Taylor et al., 2020). Participants were asked, "Are your memory, thinking skills, or ability to reason worse than a year ago"? If the answer was yes but there was no cognitive work-up or no positive findings on a cognitive work-up, then the participant was classified as having PCI. The no memory loss group included those who denied any problems with memory and had no neurocognitive diagnoses. Notably, participants with no memory loss had distinctively higher Rey Auditory Verbal Learning Test (RAVLT) scores compared to the

PCI (-7.7) and MCI (-9.3) groups (t test results are in Table 3), The average scores for the latter two groups were not statistically distinct ($p = .530$).

### Lichtenberg financial decision rating scale (LFDRS)

To assess financial decision-making, we used the Lichtenberg Financial Decision Rating Scale (LFDRS) (Lichtenberg et al., 2015). This is a clinician-administered scale used to assess financial decision-making ability. The scale contains 56 items across four subscales: (1) Financial Situational Awareness, (2) Psychological Vulnerability, (3) Intellectual Factors, and (4) Susceptibility to Undue Influence and Financial Exploitation (FE). Interrater reliability and factor analysis that confirm the conceptual model have been documented in previous samples (see Lichtenberg et al., 2015; Lichtenberg et al., 2017), as have significant associations with cognition (Lichtenberg et al., 2017) and with FE (Lichtenberg, Gross, & Ficker, 2020). Higher scores reflect more vulnerability across the different factors (i.e., contextual, and intellectual) in financial decision-making. Flores and Lichtenberg (2023) conducted a cross-validation study of the scale, which yielded results very similar to the original validation study.

### Financial literacy

Three questions from the 2004 HRS were used to determine participants' level of financial literacy. The scale was designed to gauge the knowledge of basic financial investment concepts: interest rates and saving, inflation and spending, and investment decisions (Lusardi, 2012). The total score range is 0–3, and higher scores indicate higher levels of financial literacy. Lusardi (2012) presented evidence for the internal consistency and utility of the measure.

### Numeracy

A numeracy score was created using two items from the Independent Living Scale financial subscale (Loeb, 1996). Each question requires computation: In the first, the amount of change that would be received after a purchase; in the second, how much one would pay after insurance paid its portion of a claim. The total score range is 0–4, with higher scores indicating higher levels of numeracy. There is no reliability or validity data on using these items as a numeracy measure.

### Rey auditory verbal learning test (RAVLT)

The RAVLT (Rey, 1958) measures episodic verbal learning and memory. In this task, the examiner reads 15 nouns aloud 5 times to the examinee, who is then asked to repeat as many of the words as they can recall after each reading. Several indices are captured by the RAVLT five trials including learning over trials, trial score and total words. We used the total number of words recalled across the initial 5 trials. Spreen and Strauss (1998) summarize the extensive evidence for the reliability and validity of the RAVLT.

### Socioeconomic and demographic characteristics

Demographic factors are age, based on the birthdate provided by the participant, self-reported gender, race (e.g., White, Black, Mixed Race, etc.), and education, based on the highest level of education completed, and total income.

### Functional abilities

The Instrumental Activities of Daily Living (IADL) measures functional abilities for common tasks, such as cooking, transportation, medication, and financial management. The self-report version of the Lawton and Brody IADL Scale (Lawton & Brody, 1969) was administered to participants. Kelbling et al. (2023) described the extensive work completed providing evidence for the reliability and validity of this IADL scale.

## Statistical procedures

### Covariates

In regression analyses (see details below) we adjusted for a series of covariables. Individual level characteristics consisted of sociodemographic variables including participant's age (in years); gender (0=Female, 1=Male); race (0=White, 1=Black); and educational attainment (treated continuously as the number of self-reported years of education), and yearly income (measured in dollars). Health indicators, in addition to cognitive status (i.e., early memory decline) included functional status which was assessed using total IADL limitations as a continuous measure (Lawton & Brody, 1969), and

memory functioning which was assessed using the RAVLT, and self-report.

### Statistical approach

First, we provide a detailed summary (Ns, Means, Standard Deviations, and range) and estimate pairwise Pearson's correlations (and their statistical significance) between all measures used in the study. We then characterize sample participants by cognitive status (cognitively normal vs. PCI/MCI). For categorical measures, we provide percentages and test the differences between cognitive status groups using chi-squared statistics. For continuous measures, we provide means and standard deviation estimates by cognitive groups and test differences using two-tailed independent samples t-tests. Lastly, we fit three ordinary least squares multiple linear regression models, reflecting our conceptual framework in Figure 1, with excessive spending as our dependent variable. The first model (Model 1) included the sociodemographic variables. To test hypothesis 1, in Model 2 we added our health indicators (IADLs, RAVLT, and cognitive status). To test hypothesis 2 and 3 and examine potential attenuations in associations between cognitive status (H1) and excessive spending, we add the financial stressors and resources indicators in Model 3: the LFDRS, the FVI, as well as numeracy and financial literacy. We derive and present the estimated unstandardized regression coefficients and their standard errors as well as the p-values for these coefficients.

## Results

### Demographic description of the sample (Table 1)

The average age of the sample was 73 years, and the mean level of education was 15.6 years. Sixty-four percent of the sample were older Black adults, and 80% were women. The mean income was $44,649 and the mean monthly Social Security payment for recipients was $1,696.

*Pairwise Pearson's correlation estimates are included in* Table 2

Notably, in line with our hypotheses 1–3, excess spending was positively correlated with cognitive status ($r = 0.18$; $p = .031$), the LFDRS ($r = 0.37$; $p < .001$), and the FVI ($r = 0.19$; $p = .020$). Consistent with our conceptual framework, both the LFDRS and financial literacy were significantly correlated with income, race, and IADLs. The LFDRS was also significantly related to gender and cognitive status while financial literacy was significantly correlated with RAVLT scores and years of education.

### Differences by cognitive status (Table 3)

Participants who met criteria for PCI/MCI (vs. cognitively normal) had lower reported levels of IADLs (34.2 vs. 36.2; $p = .0023$); lower RAVLT scores ($\Delta$=-8.1; $p < .001$); higher LFDRS (15 vs. 10; $p < .001$); and higher excess spending (19.4% vs. 10.8%; $p = .031$).

**Table 1.** Sample descriptive statistics.

| | N | Mean Or pct. | Standard deviation | Min | Max |
|---|---|---|---|---|---|
| **Dependent Variable** | | | | | |
| Excess Spending (in %) | 150 | 15.5 | 24.3 | 0 | 130 |
| **Sociodemographic Characteristics** | | | | | |
| Age | 150 | 72.9 | 7.8 | 59 | 96 |
| Male | 150 | 20% | – | – | – |
| Education | 150 | 15.6 | 2.3 | 9 | 21 |
| Black | 150 | 60% | – | – | – |
| Income | 150 | 44649 | 28825 | 8917 | 152203 |
| **Health Characteristics** | | | | | |
| IADLs | 150 | 35.1 | 4.0 | 20 | 40 |
| RAVLT | 142 | 45.0 | 10.2 | 20 | 74 |
| Cognitive Status | 150 | 0.6 | 0.5 | 0 | 1 |
| **Financial Stressors and Resources** | | | | | |
| Numeracy | 145 | 2.5 | 1.4 | 0 | 4 |
| Financial Literacy | 150 | 2.1 | 0.9 | 0 | 3 |
| LFDRS | 150 | 12.7 | 8.2 | 0 | 48 |
| FVI* | 149 | 0.9 | 0.8 | 0 | 2 |

*FVI, based on three categories (0=no event, 1 = 1 event, 2 = 2+ events); Cognitive Status, binary measure:0=Cognitive Normal, 1=Perceived/Mild Cognitive Impairment (PCI/MCI); IADLs, Instrumental Activities of Daily Living RAVLT, Rey Auditory Verbal Learning Test, LFDRS=Lichtenberg Financial Decision Rating Scale.

**Table 2.** Estimates of pairwise Pearson's correlations.

| | Age | Female | African American | Education | IADLs | RAVLT | Cognitive status | LFDRS | Financial literacy CA | FVI | Excess spending % | Income |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Age | 1 | | | | | | | | | | | |
| Female | 0.010 | 1 | | | | | | | | | | |
| | 0.902 | | | | | | | | | | | |
| Black | -0.037 | -0.345 | 1 | | | | | | | | | |
| | 0.653 | <0.001 | | | | | | | | | | |
| Education | 0.024 | 0.093 | -0.190 | 1 | | | | | | | | |
| | 0.774 | 0.259 | 0.020 | | | | | | | | | |
| IADLs | -0.063 | 0.225 | -0.159 | 0.267 | 1 | | | | | | | |
| | 0.443 | 0.006 | 0.052 | 0.001 | | | | | | | | |
| RAVLT | -0.101 | -0.283 | 0.044 | 0.120 | 0.195 | 1 | | | | | | |
| | 0.233 | 0.001 | 0.604 | 0.156 | 0.020 | | | | | | | |
| Cognitive Status | 0.095 | -0.002 | -0.075 | -0.040 | -0.247 | -0.397 | 1 | | | | | |
| | 0.245 | 0.985 | 0.362 | 0.629 | 0.002 | <0.001 | | | | | | |
| LFDRS | -0.156 | -0.181 | 0.191 | -0.069 | -0.332 | -0.131 | 0.303 | 1 | | | | |
| | 0.057 | 0.027 | 0.019 | 0.401 | <0.001 | 0.121 | <0.001 | | | | | |
| Financial Literacy | 0.011 | 0.111 | -0.354 | 0.275 | 0.156 | 0.146 | -0.125 | -0.234 | 1 | | | |
| | 0.898 | 0.177 | <0.001 | 0.001 | 0.057 | 0.084 | 0.127 | 0.004 | | | | |
| FVI | 0.022 | 0.002 | -0.006 | -0.117 | -0.050 | 0.023 | -0.133 | 0.088 | 0.009 | 1 | | |
| | 0.794 | 0.983 | 0.947 | 0.155 | 0.546 | 0.784 | 0.106 | 0.285 | 0.916 | | | |
| Excess Spending % | -0.081 | -0.078 | -0.046 | 0.131 | -0.006 | 0.012 | 0.177 | 0.367 | 0.073 | 0.191 | 1 | |
| | 0.323 | 0.342 | 0.580 | 0.109 | 0.946 | 0.885 | 0.031 | <0.001 | 0.374 | 0.020 | | |
| Income | **0.085** | 0.263 | -0.295 | 0.488 | 0.175 | -0.021 | 0.029 | -0.234 | 0.364 | -0.120 | -0.021 | 1 |
| | 0.301 | **0.001** | **<0.001** | **<0.001** | **0.032** | 0.801 | 0.729 | **0.004** | **<0.001** | 0.145 | 0.796 | |

Pearson's correlations; Cognitive Status, binary measure:0=Cognitive Normal, 1=Perceived/Mild Cognitive Impairment (PCI/MCI); IADLs, Instrumental Activities of Daily Living; RAVLT, Rey Auditory Verbal Learning Test; LFDRS=Lichtenberg Financial Decision Rating Scale.; Female (0/1), African American race (0/1), Cognitive Status (0/1), and FVI (3 groups; none, 1, and 2+) are treated as numeric.
p-values <0.10 are in black bold font.

**Table 3.** Sample characteristics by cognitive status.

| | Cognitive normal | PCI/MCI | Total | p-value |
|---|---|---|---|---|
| | % (n)/Mean (SD) | | | |
| Excess Spending | 10.8 (23.9) | 19.4 (24.1) | 15.5 (24.3) | 0.0306 |
| Age | 72.0 (7.5) | 73.5 (8) | 72.9 (7.8) | 0.2454 |
| Sex | | | | |
| Male | 19.4 (13) | 19.3 (16) | 19.33 (29) | 0.985 |
| Female | 80.6 (54) | 80.7 (67) | 80.67 (121) | |
| Race | | | | |
| White | 31.3 (21) | 38.6 (32) | 35.33 (53) | 0.358 |
| Black | 68.7 (46) | 61.4 (51) | 64.67 (97) | |
| Education | 15.7 (2.2) | 15.5 (2.4) | 15.6 (2.3) | 0.6293 |
| Income | 43737 (25643) | 45385 (31294) | 44649 (28825) | 0.729 |
| IADLs | 36.2 (3.0) | 34.2 (4.5) | 35.1 (4) | 0.0023 |
| RAVLT | 49.4 (9.7) | 41.3 (9.2) | 45 (10.2) | <0.001 |
| Numeracy | 2.6 (1.4) | 2.4 (1.3) | 2.5 (1.4) | 0.3101 |
| Financial Literacy | 2.3 (0.8) | 2.0 (0.9) | 2.1 (0.9) | 0.1266 |
| LFDRS | 10.0 (5.7) | 15 (9.3) | 12.7 (8.2) | <0.001 |
| FVI | | | | |
| 0 Events | 39.4 (26) | 47.0 (39) | 43.6 (65) | 0.133 |
| 1 Event | 22.7 (15) | 30.1 (25) | 26.8 (40) | |
| 2+ Events | 37.9 (25) | 22.9 (19) | 29.5 (44) | |

p-values are based on chi-squared tests for categorical variables and t-tests ($H_0$ difference ! = 0) for continuous variables; Sex, race, and FVI are used as categorical variables. All other variables are treated as continuous.

The two groups did not differ in their mean age, education, numeracy, or financial literacy scores (all $p > .05$). We also found no difference in race or gender distributions between the two groups. Finally, the overall chi-squared test yielded no evidence of a statistically significant association between cognitive function and the trichotomous FVI index ($p = .133$) (i.e., 0 events, 1 event, 2 or more events).

**H1: Association between cognitive status and excess spending** (Table 4)

Adjusting for individual sociodemographic and health variables, participants who met the criteria

for PCI/MCI had a 9.4% increase in excess spending compared with those with no evidence of memory decline (b = 9.4; SE = 4.41; $p < .05$). While cognitive status was significantly related to excess spending even when income was accounted for, it was not statistically related to excess spending (b = 8.24; SE = 4.69; p=NS) after adjusting for the financial stressors and resources in Model 3. The average Variance Inflation Factor was VIF = 1.41 and no variable exceeded the standard threshold of 5 (maximum = 1.62) suggesting no evidence for multicollinearity among the independent variables.

## H2 and H3: Association between LFDRS, FVI, and excess spending (Table 4)

In models, adjusted for individual sociodemographic and health indicators as well as for our financial stressors and resources, each unit increase in the LFDRS was associated with a 1% increase in excess spending (**H2:** b=0.91; SE = 0.31; $p < .01$). Similarly, we found that 2+ events based on the FVI were associated with a nearly 13% increase in excess spending relative to having no events (**H3:** b = 12.81; SE = 4.86; $p = .01$).

### *Sensitivity models*

Given that our interviews revealed that $n = 8$ participants reported planned expenditures that exceeded $10,000, and to ensure that the reported associations are robust to the effects of such planned spending, we repeat all analyses as detailed above while excluding those participants. We present the models that resulted from these analyses in Supplemental Table 1. Notably, 4 out of the 8 participants with planned spending exceeding $10k were cognitively normal. Among the cognitively normal 0 out of 4 who had planned spending more than $10,000 had excess spending overall, whereas two out of the four individuals in the PCI/MCI group had both planned spending exceeding $10,000 and excess spending. Second, to assess the effects of missing covariates on our estimates, we refitted the regression models specified above using maximum likelihood (ML) with missing values techniques (full information maximum likelihood [FIML]). Under FIML, variables

**Table 4.** Association between cognitive status, LFDRS, FVI and excess spending. Results are based on models fit using ordinary least squares regression.

| | Model 1 | Model 2 | Model 3 |
|---|---|---|---|
| | b/se | b/se | b/se |
| **Age** | -0.25 (0.25) | -0.27 (0.25) | -0.13 (0.26) |
| **Sex** | | | |
| Male | ref | ref | ref |
| Female | 5.79 (5.43) | 4.38 (5.80) | 4.23 (5.73) |
| **Education** | 1.85 (0.99) | 1.93 (1.00) | 1.71 (1.01) |
| **Race** | | | |
| White | ref | ref | ref |
| Black | -3.88 (4.53) | -3.31 (4.62) | -3.34 (4.90) |
| **Income** | -0.00 (0.00) | -0.00 (0.00) | -0.00 (0.00) |
| **IADLs** | | -0.07 (0.54) | 0.59 (0.56) |
| **Cognitive Status** | | | |
| CN | | ref | ref |
| PCI/MCI | | 9.38* (4.41) | 8.24 (4.69) |
| **RAVLT** | | 0.10 (0.23) | 0.15 (0.23) |
| **LFDRS** | | | 0.91** (0.31) |
| FVI: 0 Events | | | ref |
| FVI: 1 Event | | | 6.46 (4.84) |
| FVI: 2+ Events | | | 12.81** (4.86) |
| **Numeracy** | | | -1.17 (1.53) |
| **Financial Literacy** | | | 2.75 (2.57) |
| **Intercept** | 6.08 (23.99) | -0.77 (30.16) | -53.41 (32.66) |
| **N** ‡ | 150 | 142 | 137 |

Models do not exclude missing on covariates. Model Ns reflect missingness in covariates. Intercept not interpretable since continuous covariates (e.g. age) are not centered at meaningful values.

b=unstandardized regression coefficient; se=Standard error. CN=Cognitive normal; PCI/MCI=Perceived/Mild Cognitive Impairment; FVI=Financial Vulnerability Index; IADL=Instrumental Activities of Daily Living; RAVLT= Rey Auditory Verbal Learning Test; LFDRS=Lichtenberg Financial Decision Rating Scale.

* $p<.05$; ** $p<.01$.

are assumed to satisfy "joint normality" and the data are assumed to be missing at random (we believe that this is a reasonable assumption, given that most missing values [92%] in our sample are due to numeracy and RAVLT and our models account for cognitive status and several financial literacy and decision-making indices). Discussions regarding the value of ML techniques with missing data and their comparative performance relative to other methods (e.g., complete observation analyses and multiple imputation, among others) have been published previously (see, for example, Allison, 2012). Estimates derived from these models are presented in Supplemental Table 2. Results from the sensitivity analyses indicate that the findings from our primary analyses (using the data as is) are nearly unchanged and robust relative to both the exclusion of those with planned spending exceeding $10,000 and the alternative estimation technique.

## Discussion

Using data from a racially and cognitively mixed older adults sample from the WALLET study, we hypothesized from our conceptual framework that (1) early memory loss will be associated with greater excess spending, (2) the LFDRS will be significantly related to excess spending above and beyond the effects of financial literacy, numeracy, and sociodemographic measures, and (3) a new Financial Vulnerability Index (FVI) generated from review of participants' bank statements and interviews will be significantly related to excess spending adjusting for other measures. In our bivariate and adjusted regression analysis, we found support for Hypothesis 1. Those with PCI or MCI had significantly greater overall excess spending than those with no cognitive deficits, and this relationship continued even when demographic and health factors were accounted for. This finding regarding every day, real-world personal finance is consistent with evidence that early memory loss can impact wealth (Angrisani & Lee, 2018). It also highlights the importance of the clinical gerontologist's (and psychologists in general) assessment of financial management issues in clients with early memory loss.

Our multiple regression analyses indicated that financial decision-making and identified financial behaviors (classified as the Financial Vulnerability Index [FVI]) were related to excess spending. Although early memory loss was no longer significantly related to excess spending once financial decision-making and the FVI were introduced into the model, early memory loss was, as conceived in the conceptual framework, related to financial decision-making and the FVI. This intersection of financial decision-making, specific financial behaviors, and cognitive decline underscores the multidimensional nature of financial capacity assessment. Financial capacity assessment is complex and has long been known to require a multidimensional understanding of the individual (i.e., cognitive capacity) and contextual (e.g., family and environment) factors within which behavior and decision-making occurs (American Bar Association Commission on Law and Aging and American Psychological Association, 2008; Cohen et al., 2020; Ghesquiere et al. 2019). The WALLET study data is unique however, in that they demonstrate the links between cognitive status and other financial dimensions with excess spending.

We found consistent support for Hypotheses 2 and 3, particularly among those with elevated FVI events. The LFDRS was significantly associated with excess spending above and beyond other measures of financial skills, literacy, and numeracy as well as sociodemographic measures, cognitive status, and memory performance. The results provide evidence to support the use of financial decision-making tools, including the LFDRS, as part of a multidimensional financial capacity assessment.

The analyses also supported our third hypothesis, that an FVI can act as an additional and independent tool for assessing risk for excess spending. The FVI's strongest relationship to excess spending emerged when it was used as a threshold index with a cutoff score of 2 or greater (i.e., 2–4); individuals who met this criterion exhibited particularly elevated risk of excess spending even after adjusting for a series of sociodemographic, financial, and cognitive characteristics. For the most part, these indicators do not require detailed analysis. Helping others financially and losing money to financial exploitation are self-report items that can then be

followed up on. Having bank fees for overdrafts and spending excessively for one category of expenses are both easy to identify in checking statements and can be verified by interview.

The study has several limitations. The WALLET sample is not a population-based random sample and thus the data have limited generalizability. While our findings constitute a necessary first step, extending these results to the population level requires larger sample sizes and more extensive sampling procedures (e.g. multistage probability sampling). Since discussion of finances is often considered taboo, issues of trust are paramount in this type of recruitment. Our team's involvement with a community of older adults for over two decades enabled us to recruit from participant registries. Thus, we used a convenience sample. Second, our sample size, while viable for a financial capacity study, was relatively small ($n$ = 150). The smaller sample size limited the type of statistical techniques and modeling we could implement (e.g., testing mediation and moderation models that could potentially aid in understanding the mechanisms behind the derived associations). Third, while our checking account data were longitudinal across 12 months, our interview data were cross-sectional. Thus, we were not able to engage in prospective predictions of excess spending.

Despite these limitations, several strengths should be noted. First, our sample includes a strong representation of older Black adults, which reflects the level of trust developed over decades of community-based participatory research to create and maintain the participant research registries from which this sample was drawn. This strength contrasts with most NIH funded studies which drastically under-represent diverse groups despite NIH policies (Auguste et al. 2023). In their editorial, Auguste et al. (2023) noted the limited body of mental health research that sufficiently includes older Black adults and call for researchers to find ways to include Blacks in research. The Healthier Black Elders Center 25 +year history and model provide one example of a successful effort to recruit older black adults into health research (Chadiha et al., 2011). Second, the average Social Security monthly payments were in line with the U.S. population. Third, and most importantly for clinical gerontologists (and psychologists in general), this work (a) provides evidence regarding the viability of conducting studies that focus on measurements of real-world personal finance and financial capacity, and (b) sheds light on how financial decision-making and financial management behaviors impact expenditures and wealth loss.

## Disclosure statement

Peter Lichtenberg Consultancy, LLC was created to maximize the use of financial decision-making and vulnerability tools.

## Funding

This work was supported by the National Institutes of Health P30 AG015281, Michigan Center for Urban African American Aging Research; National Institutes of Health Michigan Alzheimer's Center Core grant #P30AG072931 and the National Institutes of Health R21AG067405.

## Data availability statement

Data is available from the author currently while we work to establish an archived data set with NACDA at the University of Michigan

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