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Characterization of word-finding complaints in patients with mild cognitive impairment

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Abstract

Context. The purpose of this study is to better characterize word-finding complaints as a subjective complaint in patients with mild cognitive impairment (MCI). To do this, we must 1) identify if word-finding complaints are as severe and frequent as memory complaints; 2) determine if patients with MCI rate themselves as having less severe word-finding difficulties than their caregivers, and; 3) determine if self-reported word-finding complaints in MCI predict objective language performance on cognitive tests. **Method.** For the first objective, a paired-samples t-test was conducted to compare symptom severity between language complaints and memory complaints from the Everyday Cognitive Questionnaire (ECog), and multiple 2x2 chi-square tests of independence to analyze the frequency of the complaints. For the second objective, a 2-way mixed ANOVA (2x2) was performed to compare participants' self-report data with the caregivers' data. For the last objective, a stepwise regression analysis was performed to determine if the level of subjective language complaints in MCI could predict objective performances on cognitive tests. **Results.** A specific word-finding complaint was found to be more severe and more frequent than some memory complaints, but not all. Secondly, patients with MCI were found to rate themselves as having more word-finding complaints than their caregivers. Lastly, specific self-reported word-finding complaints in MCI were found to predict objective language performance on cognitive tests. **Conclusions.** Our work has shown that word-finding complaints are important when assessing and diagnosing patients with MCI, and should be included in the evaluation process by both clinicians and researchers.

Keywords: mild cognitive impairment, language, subjective language complaints, memory complaints, normal ageing, pathological ageing, dementia.

Résumé

Contexte. L'objectif de cette présente étude est de mieux caractériser les plaintes de recherche de mots comme une plainte subjective chez les patients atteints d'un trouble cognitif léger (TCL). Pour se faire, nous devons 1) identifier si les plaintes de recherche de mots sont aussi graves et fréquentes que les plaintes de mémoire ; 2) déterminer si les patients atteints d'un TCL s'évaluent comme ayant des difficultés moins graves que leurs soignants et ; 3) déterminer si les plaintes subjectives de recherche de mots dans les TCL ils prédisent les performances langagières objectives aux tests cognitifs. **Méthode.** Premièrement, un t-test à échantillons appariés a été effectué pour comparer la gravité des symptômes entre les plaintes de langage et les plaintes de mémoire du Everyday Cognitive Questionnaire (ECog), et plusieurs tests d'indépendance du chi carré 2x2 pour analyser la fréquence des plaintes. Deuxièmement, une ANOVA mixte à 2 facteurs (2x2) a été réalisée pour comparer les données autodéclarées des participants avec les données des soignants. Finalement une analyse de régression stepwise a été réalisée afin de déterminer si le niveau de plaintes subjectives du langage en TCL pouvait prédire les performances objectives aux tests cognitifs. **Résultats.** Une plainte spécifique de recherche de mots s'est avérée plus grave et plus fréquente que certaines plaintes de mémoire, mais pas toutes. Deuxièmement, il a été constaté que les patients atteints d'un TCL s'estiment avoir plus de problèmes de recherche de mots que leurs soignants. Enfin, il a été constaté que des plaintes spécifiques subjectives de recherche de mots en TCL prédisaient la performance objective du langage lors de tests cognitifs. **Conclusions.** Notre travail a montré que les plaintes liées à la recherche de mots sont importantes lors de l'évaluation et du diagnostic des patients atteints d'un TCL et devraient être incluses dans le processus d'évaluation par les cliniciens et les chercheurs.

Mots-clés : trouble cognitif léger, langage, troubles subjectifs du langage, troubles de la mémoire, vieillissement normal, vieillissement pathologique, démence.

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List of Abbreviations

ADNI: Alzheimer's Disease Neuroimaging Initiative Database

aMCI: Amnestic MCI

BNT: Boston Naming Test

CDR: Clinical Dementia Rating Scale

ECog: Everyday Cognitive Questionnaire

EMQ: Everyday Memory Questionnaire

GDS: Geriatric Depression Scale

IADL: Instrumental activities of daily living

MAC-Q: Memory Complaint Questionnaire

MCI: Mild cognitive impairment

md-MCI: MCI multiple domain

MMSE: Mini-Mental State Examination

naMCI: Non-amnestic MCI

QAM: Self-Evaluation Questionnaire

sd-MCI: MCI single domain

SMC: Subjective memory complaints

SMCQ: Subjective Memory Complaints Questionnaire

TOT: Tip-of-the-tongue phenomenon

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1. Introduction

Mild cognitive impairment (MCI) is a clinical syndrome defined by cognitive and functional impairments which are not significant enough to fulfill clinical criteria for dementia, but are beyond normal standards for healthy adults (Hojjati et al., 2018; Petersen et al., 1999). Individuals who have been diagnosed with MCI have a higher risk of developing Alzheimer's disease or other types of dementia, ranging from 10-15% (Albert et al., 2011; Hojjati et al., 2018).

The presentation of MCI includes changes in a variety of different cognitive domains. These include memory, executive function (e.g., problem-solving, planning, reasoning, set-shifting), attention (e.g., simple and divided attention), language (e.g., naming, comprehension, expressive speech, fluency), and visuospatial skills (Albert et al., 2011). During cognitive assessments, individuals with MCI will often have scores on cognitive tests that are 1 to 1.5 standard deviations below the mean for their age and their education (Albert et al., 2011; Dubois & Michon, 2015).

From a clinical perspective, certain criteria need to be met to receive a diagnosis of MCI. For Criteria 1, there must be a perception of a change in cognitive functioning compared to a previous level; this can be reported by close family members or friends who notice that the individual takes more time to complete certain tasks, or that they do so less efficiently and make more errors while performing usual activities. For Criteria 2, they must have a deficit in one or more cognitive domains with a decrease in performance in several evaluations repeated over time. Criteria 3 includes the preservation of functional independence, which can involve small difficulties in complex tasks that the individual used to do, and in which they are now less efficient. These can include, but are not limited to, cooking a familiar recipe, running errands,

and paying their bills on time (Albert et al., 2011). The fourth and last criteria includes an absence of dementia, whereas the cognitive disorder is as sufficiently discreet to not significantly alter social and occupational functioning (Albert et al., 2011; Petersen et al., 1999).

1.1 Types of MCI

Based on cognitive profiles, Petersen et al. (2014) proposed a classification system for the subtypes of MCI. These subtypes are organized into two categories: the first is *amnestic MCI* (aMCI), reflecting poor scores on episodic memory during neuropsychological assessments, and the second is *non-amnestic MCI* (na-MCI), reflecting poor scores on any other cognitive domains aside from memory that are evaluated during neuropsychological assessments (Petersen et al., 2014). As there is variability amongst individuals in terms of their affected cognitive domains, their impairments are classified as either *single domain*, representing one affected area, or *multiple domains*, representing more than one affected area; consequently, individuals could be classified in one of four existing clinical subtypes: aMCI single domain (sd-aMCI), aMCI multiple domain (md-aMCI), na-MCI single domain, or na-MCI multiple domain (Petersen et al., 2014; Raamana et al., 2014). The most frequently diagnosed MCI subtypes were those found in the amnestic MCI category, as memory was the most common complaint, and they were more likely to lead to a diagnosis of dementia (Petersen et al., 2014). More specifically, one study found that the aMCI multiple domain cohort (md-aMCI) presented an increased risk of conversation to AD dementia than the aMCI single domain cohort (sd-aMCI) (Raamana et al., 2014).

1.2 Subjective memory complaints

Cognitive complaints are an integral part of the MCI diagnosis. The literature has defined subjective memory complaints (SMC) as “self-experienced persistent decline in memory or any other cognitive ability in comparison with a previously normal status” (Avila-Villanueva et al.,

2016, p. 1). Memory complaint is a central part of an MCI diagnosis, especially in aMCI; further, it is an imperative criterion in the varying definitions of MCI (Yates et al., 2017). Memory complaints more specifically can include, but are not limited to, difficulty learning and remembering new information, such as forgetting appointments or events, repeating questions and conversations, as well as disorientation on a familiar route (McKhann et al., 2018).

Because memory complaints are both frequent and severe in MCI, it is important to determine whether these instances of memory complaints are representative of normal ageing, or rather representative of a possible underlying cognitive decline (Mark & Sitskoorn, 2013). Memory complaints are quantified using subjective scales that are administered to patients. An increasing number of studies have investigated quantitative approaches based on the results of the tests that are specifically designed to study the complaints. Examples of quantitative tests include the following:

Everyday Memory Questionnaire

The Everyday Memory Questionnaire (EMQ) has 28 items that investigate memory failures in everyday life; these questions are answered using a Likert-type scale and are based on the frequency of which these complaints are experienced (Avila-Villanueva et al., 2016). Although created to explore SMCs, the items in this questionnaire correspond to other cognitive domains aside from memory, such as visual perception, attentional processing, language production, and executive function (Avila-Villanueva et al., 2016).

Self-Evaluation Questionnaire

The Self-Evaluation Questionnaire (QAM) is used to assess memory complaints that fall within 10 domains of activities experienced in daily living; 64 questions are separated into categories exploring episodic memory, working memory, prospective memory, general events,

face processing, orientation in space, and praxia (Clément et al., 2008). Using a 6-point Likert scale, participants can answer from Never (1) to Always (6) regarding the frequency in which they face such difficulties in specific situations (Clément et al., 2008). Langlois (2015) found that in comparison to older healthy adults, increased cognitive complaints relating to memory for complex information, such as in text or conversation, were reported by progressive MCI individuals; such complex information included recent events, as well as details about familiar people.

Memory Complaint Questionnaire

The Memory Complaint Questionnaire (MAC-Q) developed by Crook et al. (1992) contains six items; this is a limited number of questions like previous memory complaint questionnaires (Reid et al., 2012; Ribeiro et al., 2017). In a study by Brum et al. (2013) evaluating subjective memory and language complaints with the MAC-Q, the results showed a negative correlation between *Story recall* and *overall memory* evaluation in the MCI group, suggesting that worse performance in the task was associated with higher self-reported memory ability.

Subjective Memory Complaints Questionnaire

The Subjective Memory Complaints Questionnaire (SMCQ) is a 14-item measure that explores various elements of SMCs; four of the questions address global memory function and the remaining 10 questions look at everyday memory function (Youn et al., 2009). This is a useful questionnaire to use when researchers and/or clinicians are unable to administer these questions to reliable informants (Youn et al., 2009). Duman et al. (2015) administered the SMCQ in their study looking at subjective and objective memory deficits in MCI and found that a significantly higher number of SMCs was found in the MCI group compared to the control group, as well as statistically significantly higher SMCQ scores in the MCI group compared to the control group.

Everyday Cognitive Questionnaire

The Everyday Cognitive Questionnaire (ECog) is a participant- and informant-rated questionnaire with 39 items on a 4-point Likert scale; higher scores represent greater functional impairment. This questionnaire is powerful as it can detect mild changes in function that surface prior to significant loss of independence in daily living; however, it is also influenced by biases, and like many complaint questionnaires, it is not based on performance measures (Rueda et al., 2014).

The quantification of cognitive complaints, especially SMCs, is poorly defined (Gifford et al., 2014). Various studies evaluating memory complaints are using either a small number of questions or are using larger-scale tools to measure different types of cognition (Clément et al., 2008). Although some of the discussed measures have been self-report or informant-based, the literature states that mutual complaints (i.e., both self-reported and informant-reported) may be a stronger predictor of unhealthy brain ageing (Gifford et al., 2014). In the results of the above listed memory scales, research showed that SMCs in the MCI population were both more severe and significantly increased in comparison to control groups; these findings suggest that these memory scales can discriminate MCI from normal ageing when assessing SMCs. The MCI population tended to report increased memory complaints on items reflecting simple tasks and recall of basic information; these included remembering a few shopping items, remembering appointments, recent events, popular phone numbers, as well as details about familiar people. It has been suggested in the literature that the use of structured questionnaires is a more strategic approach to gaining insight into older adults' SMCs, rather than the existing measures being used (Avila-Villanueva et al., 2016; Montejo Carrasco et al., 2012).

If memory scales included detailed questions to better characterize memory complaints, we

could identify clearer profiles of memory deficits. Memory complaints play an important role in the MCI population; nevertheless, the literature does not yet provide a robust point of reference for characterizing these complaints. Although some of the studies can reflect this, the clinical portrait is still unclear.

1.3 Language Complaints

Word-Finding Problems

Although a major component of MCI implicates memory, another common complaint found in MCI involves language. More specifically, a cognitive complaint that is often reported is the difficulty in finding the right name of objects, places, and people. Word-finding difficulties are explained as having a strong feeling of knowing someone's name or knowing a specific word but having difficulty in retrieving said name or word on the spot (Abrams & Davis, 2016; Juncos-Rabadan et al., 2013a). Like the tip-of-the-tongue (TOT) phenomenon, defined as the experience of knowing the meaning of specific information, but being incapable of producing the phonological information, this language problem is frequently reported in older adults (Campos-Magdaleno et al., 2020; Juncos-Rabadan et al., 2009; Oh et al., 2015). Although increased word-finding difficulties are still seen as normal and healthy ageing, it has also served as an indicator of pathological ageing, which has given cause to debate in current research (Abrams & Davis, 2016; Montembeault et al., 2022).

As a common language complaint in ageing, this phenomenon should be further explored in hopes of discriminating the MCI population from normal and healthy ageing.

Objective language difficulties in MCI

Word-finding difficulties are found in both MCI and early stages of Alzheimer's disease. In terms of failing to identify the names of famous individuals, aMCI patients experience trouble

in retrieving the correct phonological representations, but do not experience these same difficulties with semantic representations (Juncos-Rabadan et al., 2013b). Conversely, Joubert et al. (2009) found that semantic memory, specifically in knowledge of objects and famous people, was impaired in aMCI when compared to a healthy population.

In a study exploring verbal fluency in individuals with aMCI, results demonstrated a significant decline in their performance when compared to healthy controls that were demographically matched (Nutter-Upham et al., 2008). Additionally, their results suggested that fluency tasks involve executive control, and are less dependent on semantic knowledge. Hwang et al. (2017) used a time-constrained naming test in their study with MCI patients; their results revealed that individuals with MCI had more severe impairment in noun-naming tasks, and delayed responses in both noun- and verb-naming tests in comparison to healthy elderly controls. The results indicated that time-constrained naming tests have stronger external validity as they reflect the difficulty that individuals experience in real-life situations. Further, the results reveal that these tests are useful in assessing high-functioning adults because of their high discriminative power, as opposed to conventional naming tests that are simply timed (Hwang et al., 2017). In terms of frequency, Ahmed et al. (2008) found that 87% of individuals with MCI in his sample, who were labeled as high-risk of developing dementia, were impaired on naming tasks.

Another study evaluating language in aMCI and Dementia of Alzheimer's type found that their aMCI group possessed intact access to semantic knowledge with both verbal and non-verbal cues (Jokel et al., 2019). Consistently, the results of a study by Juncos-Rabadan et al. (2009) found that difficulty in lexical access can occur by a transmission deficit from semantic representations to phonological representations in individuals with MCI.

Although word-finding difficulties are found in the MCI population, it has yet to be shown

whether it constitutes a specific cognitive complaint as part of the MCI diagnostic criteria.

The Boston Naming Test

The Boston Naming Test (BNT) is a neuropsychological instrument that assesses the ability of participants to spontaneously and correctly name 60 line-drawings of objects, also known as "confrontation naming" (ADNI, 2020c; Folia et al., 2022; Kaplan et al., 1983). When an individual fails to name the drawing presented to them, the practitioner can then provide a phonetic and/or semantic cue (Balthazar et al., 2008). This test is particularly sensitive to individuals suffering from aphasia, as well as those with object recognition deficits (ADNI, 2020c; Folia et al., 2022). The BNT, as well as its shorter forms that include either 15 or 30 items instead of 60 (BNTsf) are ubiquitous measures used in both research and clinical practice when assessing language. Given that patients with MCI are known to frequently report problems with finding words during conversations with others, the BNT is practical tool to us when examining semantic processing in ageing populations, both healthy controls and individuals with MCI (Balthazar et al., 2007; Madore et al., 2020; Willers et al., 2008).

The literature has provided opposing evidence regarding the use of the BNT in individuals with MCI. A study by Balthazar et al. (2007) looking at lexical semantic memory in aMCI found that the aMCI patients obtained similar results on the BNT as healthy controls, suggesting that the tool is not sensitive enough to detect slight changes in cognition. Conversely, a study by Folia et al. (2022) found that stronger performances on the BNT correlated with reduced risk of MCI and Alzheimer's Clinical Syndrome, suggesting that the measure could be used a predictive tool for cognitively normal ageing adults. Further research has taken its place in between these two opposing views; in a study examining naming errors in patients with aMCI, the results showed that, although the aMCI patient scores did not differ significantly compared to healthy controls,

the aMCI patients presented with significantly higher semantic errors than their healthy counterparts (Willers et al., 2008).

Taken together, this objective language test continues to be used in the current literature, providing evidence that it can be beneficial in both research and clinical fields of practice when assessing language difficulties in individuals with MCI.

Are Word-Finding Complaints Part of Cognitive Complaints in MCI?

In the various questionnaires assessing cognitive complaints, there are questions that are specific to language complaints, including word-finding difficulties. As previously mentioned, word-finding complaints are commonly found in normal and healthy ageing, but are even more common in the MCI population. Word-finding complaints have been less studied than memory complaints, and we do not know their relative importance. With the help of these measures based on self-reported data, we can assess and use specific memory complaints as diagnostic criteria in MCI. However, due to the nature of the symptom we are assessing, can we trust the judgment of individuals with MCI on self-report measures? What would happen if we asked a third party, such as a close family member or caregiver, to evaluate the individual with MCI using these scales?

1.4 Anosognosia

What is anosognosia

In the assessment of individuals with MCI, another significant factor to consider is the common diagnosis of anosognosia. Defined as "a disorder of human consciousness that negatively impacts the patient's ability to subjectively experience a loss of an impaired neurological or neuropsychological function" (Prigatano, 2009, p. 607), anosognosia is seen as a significantly decreased level of self-awareness, especially in terms of one's cognitive capacities

(Fragkiadaki et al., 2016). Research has shown the medial temporal lobes play an important role in anosognosia in MCI; additionally, anosognosia has been found to be associated with frontal lobe and cortical midline regional dysfunction, as well as decreased parietotemporal metabolism (Mondragon et al., 2019; Tondelli et al., 2018). This symptom of lack of self-awareness plays an important role in the assessment of individuals with MCI, as it would compromise the individual's capability of adequately reporting their SMCs.

Measuring anosognosia in MCI

To measure anosognosia, researchers have created self-assessment scales for participants to rate their level of performance in comparison to other people of the same age and education. Others have administered an existing standardized scale to measure anosognosia, called the Anosognosia Questionnaire for Dementia (AQ-D) (Fragkiadaki et al., 2016; Orfei et al., 2010). The literature dictates that individuals with MCI are unaware of their memory deficits and experience a more severe degree of anosognosia than healthy controls (Galeone et al., 2011; Mak et al., 2015). Conversely, some studies have found that anosognosia is frequent in mild AD and not found in individuals with aMCI or multiple domain MCI (md-MCI) (Orfei et al., 2010). As this symptom has been found in the MCI population, and can interfere with self-reported data, it is important to administer scales to both individuals with MCI and their caregivers; comparing their responses can assist in assessing the severity of MCI.

A study by Fragkiadaki et al. (2016) found that MCI patients would overestimate their performance in different cognitive domains, further indicating their lack of awareness of their memory deficits; this finding is further supported by Lehrner et al. (2015), who compared MCI patients with cognitively healthy individuals, and concluded that the individuals with MCI tended to overestimate their performance in measures regarding memory awareness. However, Kalbe et

al. (2005) found that MCI patients had reported significantly more cognitive impairment than reported by their caregivers, which opposes previous research. In a separate study, individuals with MCI could relate their cognitive deficits to a disease or diagnosis, such as anosognosia, whereas multiple studies found that aMCI subjects shared the same level of impaired awareness regarding memory deficits with those in the Alzheimer's Disease group (Lindau & Bjork, 2014; Mak et al., 2015; Vogel et al., 2004). The deficits experienced by individuals with MCI frequently interfere with instrumental activities of daily living (IADL); as anosognosia is considered a risk of progressive cognitive deterioration, further clinical consideration should be enforced in patients with decreased awareness of their MCI (Mak et al., 2015; Putcha & Tremont, 2016). Further, the research has shown evidence that individuals with MCI tend to both over-report and under-report memory complaints in comparison to what is reported by their caregivers. These findings leave us with more gaps in the literature, including the reliability of the judgment of patients with MCI on their memory failures, and whether their self-reported complaints reflect their actual abilities. The validity of SMCs as a useful screening criterion continues to be one of the biggest clinical concerns in terms of diagnosing an individual with MCI (Fragkiadaki et al., 2016).

1.5 Conclusion

Taken together, these studies reveal that analyses of memory complaints based on multiple quantitative tests can be an important clinical tool to measure complaints. Previous studies suggest that it could be important to investigate word-finding complaints as part of cognitive complaints in the MCI population. These points raise several questions: are word-finding difficulties as frequent and severe as memory complaints? Should word-finding difficulties be considered as independent complaints? And further, can we trust the judgment

of MCI patients on their language and memory failures?

1.6 Objectives & Hypotheses

Objective 1

To better characterize word-finding complaints as a subjective complaint in the MCI population. To do this, we are going to analyze the results of the Measurement of Everyday Cognition questionnaire (ECog) by comparing the responses to the language complaint items with the responses to the memory complaint items.

Hypothesis 1

In the MCI population, word-finding complaints are as severe and frequent as memory complaints.

Objective 2.1

To compare self-reported subjective language complaints in the MCI population with the judgment of their caregivers/informants.

Hypothesis 2.1

Individuals with MCI rate themselves as having less severe word-finding difficulties than their caregivers/informants.

Objective 2.2

To determine if self-reported word-finding complaints in MCI predict objective language performance on cognitive tests.

Hypothesis 2.2

Self-reported word-finding complaints in MCI predict objective language performance on cognitive tests.

2. Methodology

Participants in this study were selected from the Alzheimer's Disease Neuroimaging

Initiative database (ADNI). ADNI is a longitudinal multicentre study with the goal of tracking the progression of Alzheimer's disease with the use of both clinical measures and biomarkers (ADNI, 2020a). Launched over a decade ago, participants enrolled in ADNI are recruited from 57 different sites across the United States and Canada (ADNI, 2020a).

2.1 Participants

A total of 764 MCI participants from the ADNI database were included in the study. As per the general eligibility criteria, participants must be between the ages of 55-90 (inclusively), must speak English or Spanish fluently, have completed six grades of education or have sufficient good work history to exclude intellectual developmental disorder, have a study partner available who can accompany the participant to all clinic visits, and be willing to participate in a longitudinal imaging study (ADNI, 2020b).

The ADNI database includes 16,363 entries; 4,678 of which meet criteria for MCI or LMCI (late-MCI). As this project is interested in the MCI population, all other participants in the ADNI database were excluded. Further, we excluded participants who did not have a study partner, as well as participants who did not complete the ECog questionnaire (1,636 excluded). Because the database includes a separate entry for each of the participants' study visits, we kept only one entry per participant and excluded the remaining entries (2,206 excluded).

Of the remaining 836 participants, we excluded participants who had checked the option "I don't know" to one or more questions in the memory and language domains of the ECog questionnaire; 6.4% of the sample answered this way to one question, 1.7% to two questions, 0.52% to three questions, 0.66% to four questions, and another 0.13% to five questions or more. A total of 72 participants were thus excluded from the study, resulting in a total sample of 764 participants. This sample of participants was used in data analyses for Objectives 1 and 2.2.

Because Objective 2.1 analyzes the ECog data between participants and their study partners, we excluded participants whose study partners did not complete the ECog questionnaire (137 participants excluded). This final step resulted in a total sample of 627 participants, which was used in statistical analyses for Objectives 2.1.

2.2 ADNI Inclusion criteria

As per the MCI criteria determined by ADNI, participants had to have a subjective memory concern, either self-reported or reported by a study partner or clinician (ADNI, 2020b). A documented abnormal memory function must be present from the Logical Memory II subscale from the Weschler Memory Scale – Revised, and participants must have a Memory Box score of at least 0.5 on the Clinical Dementia Rating Scale. Participants must have a Mini-Mental State Exam score between 24 and 30 inclusively to be considered MCI, and general cognition and functional performance had to be sufficiently preserved as to not be diagnosable with Alzheimer's disease; participants have preserved independence and maintain daily activities (ADNI, 2020b). In line with previous MCI diagnostic criteria, these participants would be considered amnestic MCI patients, either single- or multi-domain (Petersen, 2014).

2.3 ADNI Exclusion criteria

Participants must have a Geriatric Depression Scale score of less than 6, be in generally good health with no diseases that could interfere with the study and have both adequate visual and auditory acuity for neuropsychological testing. All participants must have a Hachinski score less than or equal to 4. The Hachinski identifies vascular burdens in individuals with suspected cognitive impairment or dementia (Choe et al., 2018). Female participants cannot be pregnant, lactating, or be of childbearing potential (must be two years post-menopausal or surgically sterile) (ADNI, 2020b). Other exclusion criteria for participants include: any significant neurological

disease other than suspected Alzheimer's; evidence of infection, infarction, or other focal lesions in the screening/baseline MRI scan; any psychiatric illness, or significant illness or medical condition that could interfere with the study protocol; the use of psychoactive or other exclusionary medication that could interfere with the study (such as antidepressants, neuroleptics, and anxiolytics); clinically significant abnormalities in B12 or TFT's that could interfere with the study; investigational agents are prohibited one month prior and during the duration of the study; participation in other clinical studies that involve neuropsychological measures more than one time per year; and FDG PET scan and amyloid imaging with florbetapir F18 (ADNI, 2020b).

2.4 Study inclusion and exclusion criteria

The inclusion and exclusion criteria in the ADNI database were established to ensure that all participants with MCI that were included in the database were free from all extraneous variables that could negatively influence their study. Although these criteria were not established for our study, as many of them are not required for our sample, these criteria are nonetheless both comprehensive and valid to ensure the inclusion of participants with MCI, and exclusion of extraneous influences.

2.5 Procedure

Inclusion criteria measures

1. *Logical Memory Tests I and II (Story A) (WMS-R)*

The Logical Memory Tests I & II are tests from the Wechsler Memory Scale-Revised, used to assess episodic memory. Test I: Immediate Recall asks the participant to retell a story from memory immediately after hearing the story, and Test II: Delayed Recall evaluates delayed memory recall and is administered to the participant 30-40 minutes after Test I (ADNI, 2020c; Wechsler, 1987). Abnormal memory function must be documented in this test for participants

to meet ADNI's inclusion criteria.

2. *Mini-Mental State Examination*

The Mini-Mental State Examination (MMSE) is used to evaluate orientation, memory, attention, concentration, naming, repetition, comprehension, as well as sentence-creating capacities and geometric figure copying (ADNI, 2020b; Folstein et al., 1975). This fully structured screening instrument has a score range from 0-30, with lower scores indicating greater cognitive impairment, and 30 representing perfect performance (ADNI, 2020b). For the ADNI database, MCI participants must have a score of 24-30, as a score lower than 24 could suggest impairment that exceeds what is found in MCI.

3. *Clinical Dementia Rating Scale*

The Clinical Dementia Rating Scale (CDR) evaluates six categories of cognitive functioning: memory, orientation, judgment and problem-solving, community affairs, home and hobbies, and personal care (ADNI, 2020b; Hughes et al., 1982). Participants with MCI must have a score of 0.5 or greater to meet ADNI's inclusion criteria.

4. *Geriatric Depression Scale*

The Geriatric Depression Scale (GDS) consists of 15 questions that evaluate depressive symptoms in the elderly (ADNI, 2020b; Yesavage et al., 1983). The GDS is a self-report scale using yes/no answers regarding the participant's experiences over the past week (ADNI, 2020b). Participants must have a normal score of 0-6 to meet criteria for MCI in the ADNI database, as an increased score could suggest traits or a state of depression.

Tests to evaluate subjective language and memory complaints

1. *Measurement of Everyday Cognition (ECog)*

The Measurement of Everyday Cognition (ECog) assesses very mild functional

impairment that can be identified in MCI (ADNI, 2020b; Farias et al., 2008). In the ECog, participants complete a self-reported subjective questionnaire with various subscales, lasting approximately 10 minutes, and a second version of this questionnaire is completed by an informant, such as a family member or caregiver (ADNI, 2020b). This scale is used to measure general and domain-specific everyday functions, and can differentiate between cognitively normal subjects, MCI subjects, and Alzheimer's disease subjects (ADNI, 2020b). Using a 5-point Likert scale, participants are asked to rate their ability to perform listed everyday tasks at the present time, in comparison to their level of ability in doing the same tasks 10 years ago. These answers include: 1) Better or no change; 2) Questionable/Occasionally worse; 3) Consistently a little worse; 4) Consistently much worse, and 5) I don't know. The questions are organized into six categories representing three different domains: memory, language, and executive functioning (ADNI, 2020c). The six categories include memory, language, visual-spatial and perceptual abilities, planning, organization, and divided attention. The informant-rated version of the scale includes the same questions but based on their point of view of the subject's current abilities. If the participant is unable to complete the form due to severe cognitive impairment, the informant is asked to assist or to complete the form for them.

Tests to evaluate objective language performance

1. *The Boston Naming Test*

The Boston Naming Test (BNT) assesses the ability of participants to correctly name 60 line- drawings of objects (ADNI, 2020c; Kaplan et al., 1983). The BNT is a practical tool to be used when examining semantic processing in ageing populations as it has been shown to detect significantly more semantic errors in individuals with aMCI in comparison with healthy controls (Willers et al., 2008). This test is particularly sensitive to individuals suffering from aphasia, as

well as those with object recognition deficits (ADNI, 2020c; Folia et al., 2022).

2.6 Statistical Analyses

Statistical analyses were completed using IBM Statistical Package for Social Sciences (SPSS) for Macintosh, Version 26.0 (IBM, Armonk, NY).

Objective 1

To test hypothesis 1, a paired sample t-test was performed to compare the severity and frequency of memory complaints with the severity and frequency of language complaints from the ECog questionnaire. A sample of 764 patients with MCI was used to compare both the severity and the frequency of memory complaints versus language complaints. We focused our investigation on the two domains of interest (the memory domain and the language domain), for a total of 17 questions rated on a 4-point Likert scale (Appendix A). Two questions from the language domain were selected for the statistical analyses of this objective, as they were specifically related to word-finding difficulties: Question 1 represents the "*forgetting the names of objects*" complaint, and Question 3 represents the "*finding the right words to use in a conversation*" complaint. A complete list of the Language domain questions can be found in Appendix A.

A paired-samples t-test was conducted to compare symptom severity between Question 1 of the language domain, "*forgetting the names of objects*", and each of the eight different memory questions. Additionally, multiple 2 x 2 chi-square tests of independence were performed to analyze the frequency between language complaints and memory complaints. Four frequency variables are found on the ECog questionnaire as part of a 5-point Likert scale, ranging from lowest frequency to highest frequency (see Appendix B). For our analyses, we systematized the two lower frequency values into one independent value and repeated the same steps for the two

higher frequency values. The two frequency values were created for both language and memory variables: “0” indicates lower frequency of the complaint, and “1” indicates higher frequency of the complaint.

Objective 2.1

For hypothesis 2.1, the mean result of participants’ self-report data will be compared with the mean result of caregivers’ data from the ECog questionnaire. To do this, a 2-way mixed ANOVA (2 x 2) will be performed, where the two in-between factors are the two separate raters, and the two within-factors are the memory complaints and the word-finding complaints.

Objective 2.2

Finally, for hypothesis 2.2, we will use a stepwise regression analysis to determine if the level of subjective language complaints in MCI (measured in the ECog language domain) can predict the objective performances on cognitive tests, more specifically the performance at the Boston Naming Test, representing the dependent variable in the statistical model. The analysis will include two different models in which language performance from the Boston Naming Test represents the dependent variable. Demographic information known to influence the Boston Naming Test (e.g., age, sex, education, and global cognitive functioning) will be entered in the first step of the stepwise regression. In Model 1, the severity score from Question 1 will be entered as the second step, and Question 3 as the third step. In Model 2, we will use the severity score from Question 3 as a second step, and Question 1 as the third step. We have chosen to run these two models in order to distinguish the potential effects of the two ECog language questions from each other.

3. Results

All 764 participants received a clinical diagnosis of MCI (322 women, 442 men). The

participants' ages ranged from 55-91 years old (55-65 = 19.3%, 66-75 = 46.4%, 76-85 = 31.5%, and 86-91 = 2.8%). Further demographic and neuropsychological information of the sample can be found in a table in Appendix C.

3.1 Objective 1 – Severity and Frequency of Complaints

A first series of paired-samples t-test was conducted to compare Question 1 of the Language domain with each of the eight different memory questions. Results indicated that individuals with MCI reported higher symptom severity for the first language complaint "*Forgetting the names of objects*" when compared with memory question 6 "*Remembering the current date of day of the week*" (Table 1). For the remaining comparisons, results indicated that memory complaints are more severe than language complaints.

A second series of paired-samples t-test was conducted to compare Question 3 of the language domain and each of the eight different memory questions. Results indicated that individuals with MCI reported higher symptom severity for the language complaint "*Finding the right words to use in a conversation*", when compared with memory question 6 "*Remembering the current date or day of the week*" and memory question 8 "*Remembering appointments, meetings, or engagements*" (Table 1). For the remaining comparisons, results indicated that memory complaints are more severe than language complaints. Although the word-finding complaints were found to be as severe as some of the memory complaints, most of the memory complaints were significantly more severe than language complaints. These results suggest that when patients with MCI experience memory complaints, they may also experience language complaints; however, these language complaints are not equally severe.

Table 1. *Paired t-test*
Language Question 1: Forgetting the names of objects (M=2.07, SD=0.94)
Language Question 3: Finding the right words to use in a conversation (M=2.26, SD=0.95)

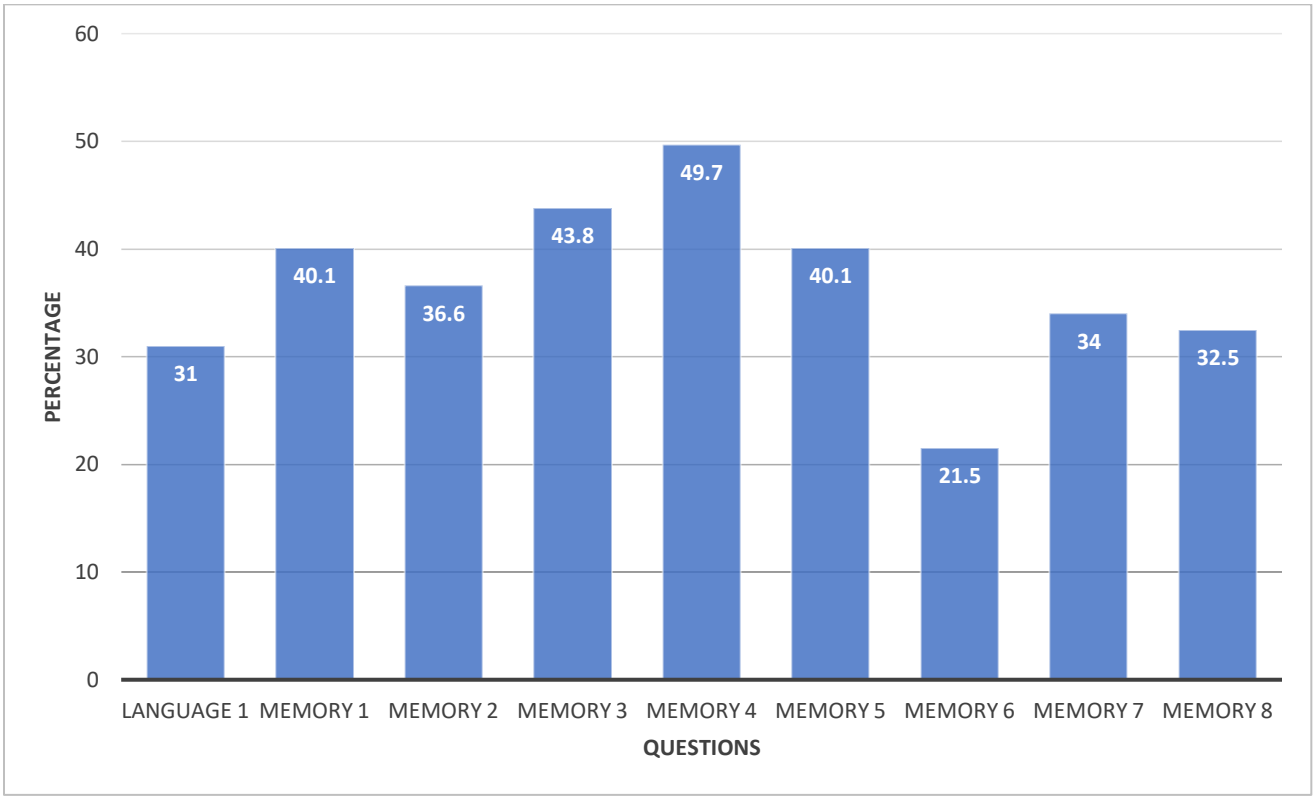
		Language Question 1 Mean = 2.07 (0.94)			Language Question 3 Mean = 2.26 (0.95)		
Memory Question	Memory Mean (SD)	*t*	p*	*d*	*t*	p*	*d*
1. "*Remembering a few shopping items without a list*"	2.32 (0.98)	6.40	0.000	-0.23	-1.50	0.133	-0.05
2. "*Remembering things that happened recently (such as recent outings, events in the news)"*	2.23 (0.93)	-4.15	0.000	-0.15	0.88	0.379	0.03
3. "*Recalling conversations a few days later*"	2.38 (0.94)	-7.91	0.000	-0.29	-3.12	0.002	-0.11
4. "*Remembering where I have placed objects*"	2.54 (0.95)	-12.11	0.000	-0.44	-7.46	0.000	-0.27
5. "*Repeating stories and/or questions*"	2.30 (0.94)	-5.77	0.000	-0.21	-1.00	0.318	-0.04
6. "*Remembering the current date or day of the week*"	1.82 (0.92)	**6.13**	0.000	0.22	**10.97**	0.000	0.40
7. "*Remembering I have already told someone something*"	2.23 (0.90)	-3.90	0.000	-0.14	0.84	0.402	0.03
8. "*Remembering appointments, meetings, or engagements*"	2.10 (0.96)	-0.74	0.463	-0.03	**4.25**	0.000	0.15

Note. T-scores in bold = These scores indicate that the Language question had a larger severity mean than the Memory questions.

Following, multiple chi-square tests were done to determine if word-finding complaints are as frequent as memory complaints in the MCI population. The first set of 2x2 chi-square tests compared Question 1 of the Language domain "*Forgetting the names of objects*" with each of the eight memory domain questions. Of these eight tests, one chi-square test was statistically significant in the direction of language complaints: the relationship between the language complaint variable "*Forgetting the names of objects*" and Question 6 of the memory domain "*Remembering the current date or day of the week*" was significant (Table 2).

Figure 1

Frequency of Severe Language Complaints



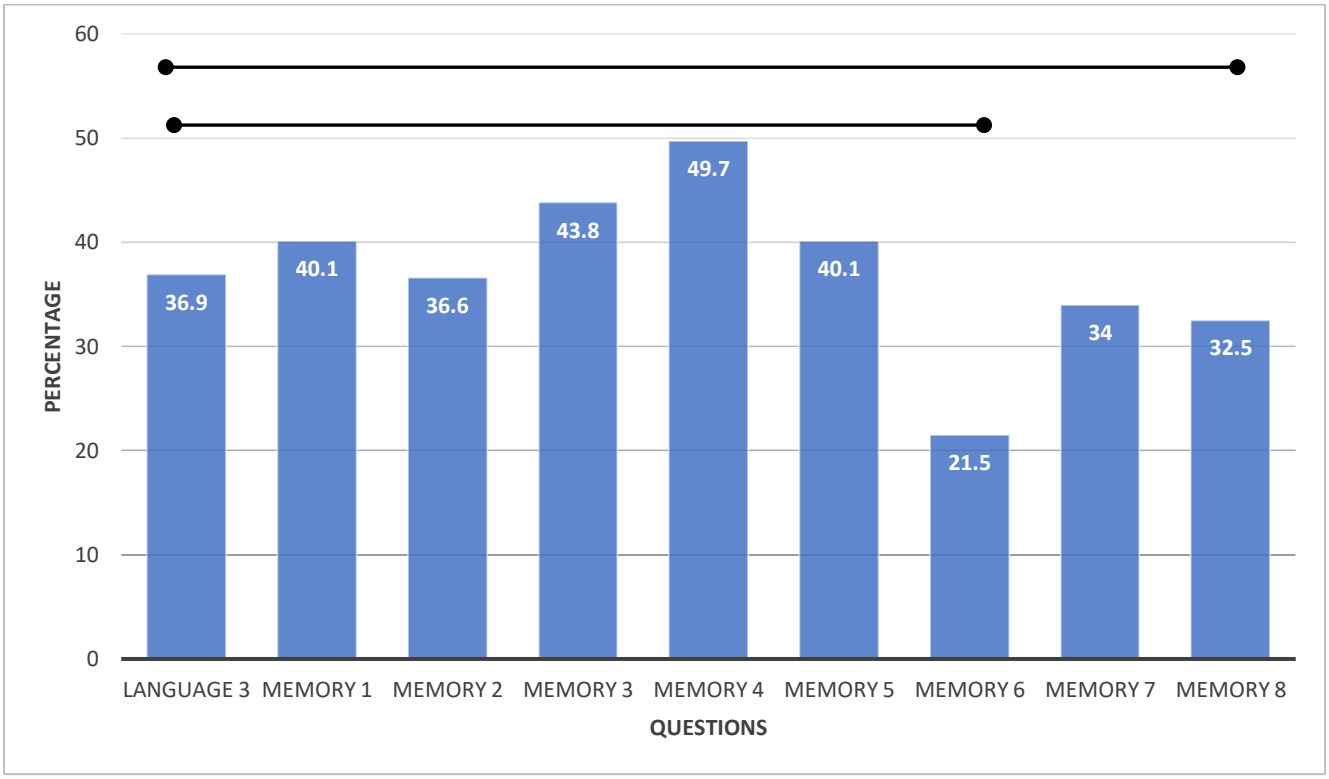
Note. Y-axis: Percentage of participants who rated the frequency of their complaints as severe (answered 3-4 on a 4-point Likert scale). X-axis: Questions from the ECog Questionnaire.

The second set of 2x2 chi-square tests compared Question 3 of the Language domain "*Finding the right words to use in a conversation*" with each of the eight memory domain

questions. All eight tests were statistically significant. In four chi-square comparisons, individuals with MCI indicated higher symptom frequency of the language complaint "*Finding the right words to use in a conversation*" than with the following four memory questions: Question 2 "*Remembering things that happened recently (such as recent outings, events in the news)*"; Question 6 memory complaint "*Remembering the current date or day of the week*"; Question 7 "*Remembering I have already told someone something*", and Question 8 "*Remembering appointments, meetings, or engagements*" (Table 2). These results indicate that individuals with MCI were more likely to experience a higher frequency of memory complaints than of language complaints.

Figure 2

Frequency of Severe Memory Complaints



Note. Y-axis: Percentage of participants who rated the frequency of their complaints as severe (answered 3-4 on a 4-point Likert scale). X-axis: Questions from the ECog Questionnaire.

Table 2. *Chi-square*

Language Question 1: "Forgetting the names of objects", Language Question 3: "Finding the right words to use in a conversation"

		Language Question 1 (31%)		Language Question 3 (36.9%)	
Memory Question	Per.*	Chi square	Dir. ***	Chi square	Dir.
1. "*Remembering a few shopping items without a list*"	40.1	X^2 (1) = 69.1, p = .00.**	M	X^2 (1) = 71.0, p = .00.	M
2. "*Remembering things that happened recently (such as recent outings, events in the news)"*	36.6	X^2 (1) = 68.1, p = .00.	M	X^2 (1) = 74.9, p = .00.	L
3. "*Recalling conversations a few days later*"	43.8	X^2 (1) = 70.0, p = .00.	M	X^2 (1) = 85.9, p = .00.	M
4. "*Remembering where I have placed objects*"	49.7	X^2 (1) = 66.5, p = .00.	M	X^2 (1) = 80.2, p = .00.	M
5. "*Repeating stories and/or questions*"	40.1	X^2 (1) = 58.9, p = .00.	M	X^2 (1) = 90.1, p = .00.	M
6. "*Remembering the current date or day of the week*"	21.5	X^2 (1) = 42.3, p = .00.	L	X^2 (1) = 65.9, p = .00.	L
7. "*Remembering I have already told someone something*"	34	X^2 (1) = 34.0, p = .00.	M	X^2 (1) = 65.2, p = .00.	L
8. "*Remembering appointments, meetings, or engagements*"	32.5	X^2 (1) = 75.6, p = .00.	M	X^2 (1) = 73.3, p = .00.	L

Note. M = Memory domain, L = Language domain

*Per. = Percentage.

**p <.01.

***Dir. = Direction. This result indicates that there is a higher percentage of severe cases in one domain than another, either higher in language than in memory, or higher in memory than in language.

3.2 Objective 2.1 – Patient-rated versus Informant-rated

Our next objective was to explore whether patients with MCI rate themselves as having less severe word-finding difficulties than their caregivers. Results indicated that patients with MCI reported higher symptom severity for the first language complaint "*Forgetting the names of objects*" when compared with the reported results of the caregivers' judgment of the participants (Table 3). For the second paired-samples t-test, results indicated that patients with MCI again reported higher symptom severity for the third language complaint "*Finding the right words to use in a conversation*", when compared with the reported results of the caregivers' judgment of the participants (Table 3). These results suggest that patients with MCI rate themselves as having more severe word-finding difficulties than their caregivers.

3.3 Objective 2.2 – Subjective Complaints Predictive of Objective Performance

Our last objective was to determine if self-reported word-finding complaints in the MCI population could predict objective language performance on cognitive tests. For Model 1 of the stepwise regression analysis, the first step consisted of our control variables. We used demographic information of the participants as control variables, including their age, sex, education, and cognitive ability. The variable age (β = -.158), sex (β =.128), education (β =.087), and cognitive ability (β =.220) explained 12% of the variance in the dependent variable, being the performance of the Boston Naming Test (R^2=.120, F(1,574)=19.48, p<.001). In the second step we added the Question 1 Language complaint. The second step explained 12.9% of the variance in the Boston Naming Test performance; adding the Question 1 Language complaint *"Forgetting the names of objects"* to the model significantly increased the power of prediction of the Boston Naming Test performance by 0.9% (R^2=.129, F(1,573)=5.92, p=.015). In the third step, we added the Question 3 Language complaint. Adding this third and final step to the model did not significantly increase

the variance (R^2=.130, F(1,572)=0.66, p=.417).

Table 3. *Paired t-test*

		Caregiver-rated Language Question 1 Mean = 1.75 (0.89)			Caregiver-rated Language Question 3 Mean = 1.86 (0.92)		
Participant-rated Language question	Mean (SD)	*t*	p*	*d*	*t*	p*	*d*
1. *"Forgetting the names of objects"*	2.07 (0.94)	7.37	0.000	0.28	-	-	-
2. "*Finding the right words to use in a conversation*"	2.26 (0.95)	-	-	-	9.39	0.000	0.342

Table 4. *Stepwise regression Model 1*

		Predictors	β	R^2	ΔR^2	Adj. R^2	F	df	Sig. F change
Step	1			.120	.120	.113	19.48	4(574)	<.001
		age	-.158						
		sex	.128						
		education	.087						
		MMSE	.220						
Step	2			.129	.009	.121	5.92	1(573)	.015
		age	-.152						
		sex	.123						
		education	.092						
		MMSE	.219						
		Ecog_lang1	-.095						
Step	3			.130	.001	.120	.66	1(572)	.417
		age	-.150						
		sex	.125						
		education	.093						
		MMSE	.218						
		Ecog_lang1	-.117						
		Ecog_lang3	.039						

For Model 2 of the stepwise regression analysis, the first step consisted again of our control variables, including participant age, sex, education, and cognitive ability. The variables age (β = -.158), sex (β =.128), education (β =.087), and cognitive ability (β =.220) explained 12% of the variance in the dependent variable, being the performance of the Boston Naming Test (R^2=.120, F(4,574)=19.48, p<.001). In the second step, we added the Question 3 Language complaint. The second step still explained 12% of the variance in the Boston Naming Test performance even after adding the Question 3 Language complaint *"Finding the right words to use in a conversation"* (R^2=.120, F(1,573)=.487, p=.486). In the third step, we added the Question 1 Language complaint. Adding this step to the model significantly increased the power of prediction by 1%, resulting in 13% of the variability being explained by Step 3 of the model (R^2=.130, F(1,572)=6.083, p=.014). The results of the Model 2 regression indicated that the Question 3 Language complaint did not

increase the power of prediction for the explained variability explained in the Boston Naming Test.

Taken together, the Question 1 Language complaint *"Forgetting the names of objects*" significantly predicted objective language performance on cognitive tests in participants with MCI.

Table 5. *Stepwise regression Model 2*

		Predictors	β	R^2	ΔR^2	Adj. R^2	F	df	Sig. *F* change
Step	1			.120	.120	.113	19.48	4(574)	<.001
		age	-.158						
		sex	.128						
		education	.087						
		MMSE	.220						
Step	2			.120	.001	.113	.487	1(573)	.486
		age	-.159						
		sex	.126						
		education	.087						
		MMSE	.221						
		Ecog_lang3	-.027						
Step	3			.130	.009	.120	6.083	1(572)	.014
		age	-.150						
		sex	.125						
		education	.093						
		MMSE	.218						
		Ecog_lang3	.039						
		Ecog_lang1	-.117						

4. Discussion

The current study aimed to fill two existing gaps in the MCI literature: whether word-finding complaints are as frequent and as severe as memory complaints, and if we can trust the judgment of MCI patients on their language and memory failures. We hypothesized that in the MCI population, word-finding complaints are as severe and frequent as memory complaints; however, this hypothesis was not confirmed. Additionally, we postulated that patients with MCI rate themselves as having less severe word-finding complaints than their caregivers/informants,

which was not confirmed in our study. Finally, we hypothesized that self-reported word-finding complaints in MCI predict objective language performance on cognitive tests; this last hypothesis was confirmed. The results of our study showed that word-finding complaints are less severe and frequent as memory complaints in patients with MCI, and that patients with MCI rate themselves as having more severe word-finding complaints than their caregivers. Additionally, we learned that specific self-reported word-finding complaints in MCI can predict objective language performance on cognitive tests (the specific language complaint being *"forgetting the names of objects"*).

Severity and Frequency of Complaints

Results indicated that word-finding complaints in patients with MCI are more severe and more frequent than some memory complaints. The specific word-finding complaint "*Forgetting the names of objects"* was more severe for individuals with MCI than the memory complaint *"Remembering the current day of the week"*. A second word-finding complaint, "*Finding the right words to use in a conversation*", was found to be more severe than multiple memory complaints, but not all of them. It is likely that memory complaints are more severe and frequent for specific questions that are critical to detect early memory changes.

Our original hypothesis was based on the existing literature regarding the frequency of word-finding complaints found in the MCI population, but not documented as much as memory complaints. Current self-report questionnaires being administered to the MCI population include language items, but these are almost always classified under the "memory domain" umbrella. The research has found that individuals with MCI will indeed decline faster in elements of speech fluency and semantic content compared to healthy controls (Chasles et al., 2019; Filiou et al., 2020; Joubert et al., 2021; Mueller et al., 2018). However, the results from our study, particularly

addressing questions investigating word-finding complaints in the MCI population, are in line with the other side of the existing literature; specifically, word-finding complaints are not as frequent or severe (Jokel et al., 2019). Further, other research has conversely shown that individuals with MCI possess intact access to semantic knowledge and do not experience difficulties in semantic breakdown (Jokel et al., 2019; Juncos-Rabadan et al., 2013b; Lajoie et al., 2016). Although this contradicts our initial hypothesis, it does corroborate the research results, specifically that the patients with MCI in our sample did not report as many severe or frequent word-finding complaints as they did with memory complaints. It is likely that word-finding complaints are the early symptoms in healthy older adults without visible cognitive deficits; however, when the cognitive profile begins to decline (like in MCI), our results show that they are more severe than some memory complaints, such as *"Remembering the current day of the week"* and *"Remembering appointments, meetings, or engagements"*, but not others. This indicates that they are important to be included in the analysis of cognitive complaints in the MCI population.

Patient-rated versus Informant-rated

The results of our study revealed that patients with MCI rate themselves as having more word-finding complaints than their caregivers, which contradicts our initial hypothesis. Our results are in line with one side of the literature on anosognosia and MCI, which has stated that anosognosia has been found to be frequent in mild AD, but not found in individuals with aMCI or multiple domain MCI (md-MCI), disputing the opposing side of the literature that had found otherwise, and contributed to our hypothesis (Fragkiadaki et al., 2016; Galeone et al, 2011; Lehrner et al., 2015; Lindau & Bjork, 2014; Mak et al., 2015; Orfei et al., 2010; Vogel et al., 2014). This could explain why patients with MCI do not overestimate their performance in

measures regarding memory awareness and word-finding complaints, as they do not experience diminished self-awareness. Another possible explanation for the results could include potential misjudgment on behalf of the caregivers. It is possible that patients might struggle with finding the words to correctly describe their difficulties, resulting in caregivers not recognizing the full extent of the patient's experienced problems. This explanation is in line with other studies that found the same contrast between patients' and caregivers' reports, specifically that MCI patients had reported significantly more cognitive impairment than reported by their caregivers (Kalbe et al., 2005). From a clinical perspective, the findings would suggest that it is strongly encouraged to administer self-report questionnaires to both the patient and the caregiver, given the existing contrast in perspectives that have been found in the literature. Although some of the research has found informant reports more meaningful regarding memory deficits in individuals with MCI, clinicians and researchers should continue to communicate directly with the MCI patient and not only their caregivers, as it can be difficult for individuals from a vulnerable population to advocate for themselves to healthcare professionals regarding word-finding difficulties (Fyock, 2015).

Subjective Complaints Predictive of Objective Performance

Specific self-reported word-finding complaints in MCI can predict objective language performance on cognitive tests, particularly, with the complaint "*forgetting the names of objects*". This suggests that subjective word-finding complaints that are self-reported in patients with MCI could reflect objective naming difficulties. These findings contradict some of the current literature that found that self-reported memory complaints (including language difficulties) were not related to objective test performance in patients with MCI who are cognitively symptomatic (Edmonds et al., 2014; Fyock, 2015; Lenehan et al., 2012). A study by

Edmonds et al. (2014) indicated that there is no relationship between self-reported cognitive ratings and objective cognitive functioning in any domain, including the language domain, and that the inclusion of self-reported complaints in MCI diagnostic criteria could result in higher rates of misdiagnoses of MCI. Another study by Calley et al. (2010) provided evidence to support the fact that a patient's subjective ratings of their word-finding impairments correlates poorly with their objective performances on neuropsychological measures of word-finding; however, our results seem to contradict this statement (Clément et al., 2008; Lee, 2015; Martins et al., 2012; Van Harten et al., 2018). They seem more in line with evidence stating that word-finding difficulties can be related to objective naming difficulties and, consequently, to progression to AD. Another interpretation of these results could suggest that individuals with MCI are more aware of their word-finding struggles than their memory struggles. As specific self-reported word-finding complaints in MCI were found to predict objective language performance on cognitive tests in our study, these subjective complaints continue to be clinically significant in the identification of MCI, as well as risk of AD (Montembeault et al., 2022).

5. Significance and Future Directions

We believe that this is an important study for furthering our understanding of word-finding complaints in subjective memory complaints from individuals with MCI. Our work showed that word-finding complaints are very important; not only are they as/more severe than some of the memory complaints, but they are also comparable to caregiver judgments and are predictive of objective complaints. Equally, this research could help clinicians in their interpretation of word-finding complaints, as well as subjective memory complaints in MCI. Consequently, this will advance research in this field as there is a current gap in the literature regarding the characterization of these specific language complaints, regardless of how common they are. Although word-finding

complaints are not all as frequent or severe as memory complaints, they are still elevated. This encourages clinicians to investigate these types of complaints, and not only explore memory (as suggested in the criteria). It is important for researchers and clinicians to take word-finding complaints seriously as they predict actual naming performances. Further, we should ask patients directly about word-finding and not solely depend on the caregivers' responses, as caregivers may underestimate the frequency and severity of the patient's complaints.

Although we fortunately have many advantages with the use of a large database for this project, like the ADNI database, few limitations exist. For example, using such a large database means limiting the questions we could explore. However, this would make a logical next step in future directions research. Another limitation includes the use of the term "word-finding"; this term is quite general and does not identify the underlying cognitive mechanisms of this experience (i.e., lexical access or semantic deficit). Finally, our study identified a correlation only with the BNT (Boston Naming Test); maybe an assessment of word-finding in connected speech would be more ecological.

Research has suggested that patients, caregivers, and physicians are unable to detect word-finding/language deficits as easily as memory deficits; Calley et al. (2010) suggest that this discrepancy could be due to several factors, such as the lack of a concise definition for word-finding difficulties, a way to measure these specific functions, as well as transparent criteria of significant impairments in the language domain. Future directions could include better defining and refining our characterizations of word-finding complaints to include semantic and lexical details; to further support evaluation and diagnosis in clinical practice, an update to the DSM-5 entry for MCI could include detailed criteria for additional cognitive domains, more specifically the language domain, as it currently only provides symptoms for the memory domain. Another

possibility includes the development of a newer clinical tool that assesses language capacities via denomination testing, but with increased sensibility to early signs and symptoms of language deficits due to MCI. This tool could include the items that assess the patient's subjective perception of themselves, as well as their awareness of their own capacities. Finally, including the use of biomarkers could be very effective in the furthering of our understanding of word-finding complaints. For example, researchers could use biomarkers to follow the onset and progression of these complaints, along with the progression of MCI.

6. Conclusion

In this study, we demonstrate that word-finding complaints are important when assessing and diagnosing patients with MCI. As we continue to expand our current knowledge on this population, as well as improve our diagnostic tools, the inclusion of word-finding complaints in the evaluation process will benefit both clinicians and researchers working with the MCI population.

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Appendices

Appendix A - The Measurement of Everyday Cognition Questionnaire (ECog)

The following figures present the Memory Domain questions and the Language Domain questions from the ECog questionnaire that were used in data analyses.

Compared to 10 years ago, has there been any change in…	BETTER OR NO CHANGE	QUESTIONABLE / OCCASIONALLY WORSE	CONSISTENTLY A LITTLE WORSE	CONSISTENTLY MUCH WORSE	I DON'T KNOW
MEMORY					
1. Remembering a few shopping items without a list.	1	2	3	4	9
2. Remembering things that happened recently (such as recent outings, events in the news).	1	2	3	4	9
3. Recalling conversations a few days later.	1	2	3	4	9
4. Remembering where I have placed objects.	1	2	3	4	9
5. Repeating stories and/or questions.	1	2	3	4	9
6. Remembering the current date or day of the week.	1	2	3	4	9
7. Remembering I have already told someone something.	1	2	3	4	9
8. Remembering appointments, meetings, or engagements.	1	2	3	4	9

Figure A1. The Memory Domain questions from the ECog.

Compared to 10 years ago, has there been any change in…	BETTER OR NO CHANGE	QUESTIONABLE / OCCASIONALLY WORSE	CONSISTENTLY A LITTLE WORSE	CONSISTENTLY MUCH WORSE	I DON'T KNOW
LANGUAGE					
1. Forgetting the names of objects.	1	2	3	4	9
2. Verbally giving instructions to others.	1	2	3	4	9
3. Finding the right words to use in a conversation.	1	2	3	4	9
4. Communicating thoughts in a conversation.	1	2	3	4	9
5. Following a story in a book or on TV.	1	2	3	4	9
6. Understanding the point of what other people are trying to say.	1	2	3	4	9
7. Remembering the meaning of common words.	1	2	3	4	9
8. Describing a program I have watched on TV.	1	2	3	4	9
9. Understanding spoken directions or instructions.	1	2	3	4	9

Figure A2. The Language Domain questions from the ECog.

Appendix B

1	There has been no change in my ability or I actually perform better compared to 10 years ago.
2	I occasionally perform the task worse but not all of the time.
3	I consistently perform the task a little worse than 10 years ago.
4	I consistently perform the task much worse than 10 years ago.
9	I don't know.

Figure B. The Likert rating scale used to assess the severity of symptoms

Appendix C

Demographics		Mean (SD)	Range
Gender (F/M)		57.9/42.1	-
Age (in years)		72.4 (7.4)	55-91
Education (in years)		16.1 (2.6)	7-20
Neuropsychological assessments			
Inclusion criteria measures			
Logical Memory Tests I & II	Immediate	11.43 (4.61)	0-22
(Story A) (WMS-R)	Delay	9.20 (5.16)	0-22
Mini-Mental State Examination (MMSE)		27.92 (1.83)	19-30
Clinical Dementia Rating Scale (CDR)		0.42 (0.25)	(-1) – (+1)
Geriatric Depression Scale (GDS)		1.89 (2.23)	0-14
Tests to evaluate objective language and memory performance			
The Boston Naming Test (BNT)		26.50 (3.41)	3-30

Appendix C. Demographic and Neuropsychological Characteristics (N = 764)

Appendix D

Measurement of Everyday Cognition (ECog)	Participant-rated Mean (SD)	Study partner Mean (SD)
Memory		
1. Remembering a few shopping items without a list.	2.32 (0.98)	2.23 (1.01)
2. Remembering things that happened recently (such as recent outings, events in the news).	2.23 (0.93)	2.13 (0.98)
3. Recalling conversations a few days later.	2.38 (0.93	2.33 (1.0)
4. Remembering where I have placed objects.	2.54 (0.95)	2.52 (1.0)
5. Repeating stories and/or questions.	2.30 (0.94)	2.16 (1.07)
6. Remembering the current date or day of the week.	1.82 (0.92)	1.69 (0.90)
7. Remembering I have already told someone something.	2.23 (0.90)	2.21 (1.02)
8. Remembering appointments, meetings, or engagements.	2.10 (0.96)	2.04 (0.99)
Language		
1. Forgetting the names of objects.	2.07 (0.94)	1.75 (0.89)
2. Verbally giving instructions to others.	1.72 (0.83)	1.63 (0.86)
3. Finding the right words to use in a conversation.	2.26 (0.95)	1.86 (0.92)

4. Communication thoughts in a conversation.	2.01 (0.91)	1.73 (0.88)
5. Following a story in a book or on TV.	1.80 (0.91)	1.66 (0.90)
6. Understanding the point of what other people are trying to say.	1.60 (0.77)	1.69 (0.86)
7. Remembering the meaning of common words.	1.46 (0.72)	1.28 (0.58)
8. Describing a program I have watched on TV.	1.82 (0.87)	1.59 (0.84)
9. Understanding spoken directions or instructions.	1.81 (0.86)	1.77 (0.88)
Visual-spatial and perceptual abilities		
1. Following a map to find a new location.	1.52 (0.80)	1.66 (0.91)
2. Reading a map and helping with directions when someone else is driving.	1.48 (0.81)	1.68 (0.92)
3. Finding my car in a parking lot.	1.71 (0.81)	1.57 (0.77)
4. Finding my way back to a meeting spot in the mall or other location.	1.58 (0.79)	1.55 (0.82)
5. Finding my way around a familiar neighbourhood.	1.27 (0.57)	1.25 (0.53)
6. Finding my way around a familiar store.	1.27 (0.57)	1.23 (0.54)
7. Finding my way around a house visited many times.	1.18 (0.47)	1.10 (0.33)
Executive functioning: Planning		
1. Planning a sequence of stops on a shopping trip.	1.54 (0.77)	1.56 (0.80)

2. The ability to anticipate weather changes and plan accordingly (i.e., bring a coat or umbrella).	1.26 (0.58)	1.29 (0.61)
3. Developing a schedule in advance of anticipated events.	1.44 (0.72)	1.56 (0.83)
4. Thinking things through before acting.	1.61 (0.75)	1.69 (0.84)
5. Thinking ahead.	1.52 (0.72)	1.73 (0.90)
Executive functioning: Organization		
1. Keeping living and work space organized.	1.72 (0.89)	1.71 (0.96)
2. Balancing the checkbook without error.	1.50 (0.81)	1.55 (0.89)
3. Keeping financial records organized.	1.60 (0.85)	1.66 (0.93)
4. Prioritizing tasks by importance.	1.55 (0.77)	1.69 (0.90)
5. Keeping mail and papers organized.	1.75 (0.88)	1.82 (0.99)
6. Using an organized strategy to manage a medication schedule involving multiple medications.	1.34 (0.65)	1.39 (0.77)
Executive functioning: Divided attention		
1. The ability to do two things at once.	1.99 (0.91)	2.09 (0.99)
2. Returning to a task after being interrupted.	1.90 (0.91)	1.90 (0.94)

3. The ability to concentrate on a task without being distracted by external things in the environment.	1.99 (0.91)	1.89 (0.86)
4. Cooking or working and talking at the same time.	1.79 (0.90)	1.79 (0.91)

Appendix D. The mean responses to the ECog items from our participant sample and their caregivers.