Prospective Memory in Mild Cognitive Impairment (PMinMCI)

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Mild Cognitive Impairment (MCI) represents a borderline condition between normal ageing and dementia. Individuals with amnestic MCI have a much higher risk of progression to dementia of the Alzheimer's type than that expected in age-matched normal people. PMinMCI focused on: (a) the identification of individuals in the transitional state between normal ageing and Alzheimer's disease, (b) recognizing memory problems they face in their day-to-day life and explaining underlying cognitive mechanisms, (c) proposing early psychological intervention aimed at reducing anxiety and worry about memory.

KEY RESEARCH QUESTIONS:

1) Which specific type of prospective memory processing (automatic or strategic) is particularly disrupted in older adults with MCI and thus can serve as an early marker of cognitive decline?
   - ✓ Prospective memory is an ability to remember to do something in the future like remembering to keep an appointment at 3;00 pm or take a medication with dinner
2) Is MCI characterised by reduction in the number of involuntary autobiographical memories and hence deficits in automatic autobiographical memory retrieval?
   - ✓ Involuntary memories are memories of events from one's personal past, which come to mind spontaneously, without deliberately trying to recall anything
3) Is there anything specific about memory complaints of MCI individuals compared to memory complaints of healthy older adults, both in terms of frequency and types of everyday memory lapses they report?
   - ✓ Everyday memory failures are classified into prospective memory lapses (forgetting to do something in the future), retrospective memory lapses (forgetting names, locations, completed actions), and absent-minded lapses (action swaps, misplacing things)
4) Are there beneficial consequences of keeping a diary of everyday memory lapses for psychological well-being of individuals with Mild Cognitive Impairment?

STUDY 1

We tested 46 MCI participants, recruited with the help of clinicians and old age psychiatrists, and 48 age-matched healthy older adults from the general population. The Fellow conducted two 2-hour long sessions with each participant. In Session 1, participants' prospective memory was assessed. To ensure that patients met the criteria of amnestic MCI, a battery of standardized tests was administered in Session 2. In addition, all participants kept a 7-day diary of their everyday memory lapses between the two sessions. As remembering to record failures was the prospective memory task per se, each participant received two phone calls every day to remind them to keep a diary. Prospective memory performance in Session 1 was measured with a novel computer-based task that had been developed specifically for PMinMCI. Participants had to identify the profession of each famous face that was presented on the computer screen. In the focal condition (prospective memory based on automatic retrieval), participants were asked to additionally respond to certain professions, i.e., politicians and

royalty, and in the non-focal condition (prospective memory required strategic retrieval), to respond to certain features of a person presented, i.e., glasses and hands visible.

STUDY 2

The Fellow tested 25 MCI individuals and 25 age-matched healthy older adults, during a 2-hour long session with each participant. The main part of the session was a computerized vigilance task. Participants were told that their concentration would be assessed with a monotonous task in which they had to detect occasional vertical lines in a continuous presentation of slides with horizontal lines. Although there would be words printed on some of the slides (e.g., "crossing the road", "a friendly boss") participants were asked to ignore them. Participants were then randomly stopped on 12 occasions during the vigilance task. When stopped, they were asked to give a brief description of their thoughts at the moment they were stopped and to indicate if the thought occurred spontaneously (i.e., simply popped into their mind) or whether they deliberately decided to think about it. When participants completed all 12 probes and finished the vigilance task, they were shown each of their 12 thought descriptions and asked to categorise their thoughts as a past memory (i.e., involuntary memory), a thought about a future event or a current situation.

MAIN FINDINGS:

1) MCI individuals performed significantly worse than healthy older adults on focal prospective memory tasks (based on automatic retrieval), but not on non-focal tasks (requiring strategic processing).
2) Substantial deficits in automatic retrieval were also found in autobiographical memory with MCI patients reporting significantly fewer involuntary memories during the vigilance task than healthy older adults.
3) MCI individuals recorded more retrospective memory lapses in the diary than healthy older adults and reported certain types of serious retrospective memory lapses that were never reported by healthy older adults.
4) Most MCI participants found keeping a diary of everyday memory lapses useful in terms of increased metamemory and control over memory lapses and reduced worry about memory functioning.

POTENTIAL IMPACT AND USE OF FINDINGS

Theoretical implications. Both studies clearly demonstrate that amnestic MCI primarily penalizes automatic memory processes. To our knowledge, PMinMCI is the first ever study on amnestic MCI to demonstrate this pattern for involuntary autobiographical memory, and only the second study to demonstrate it for prospective memory. Our findings will substantially extend current understanding of normal and abnormal cognitive ageing that has been primarily based on the assumption that it is more cognitively demanding and effortful processes (requiring attention and executive functions) that more significantly deteriorate with age. Also, the new findings critically inform our understanding of the nature of cognitive deficits in amnestic MCI, and bridge theory to practice by showing that it is automatic memory processes that should be targeted in both diagnosis and cognitive rehabilitation of amnestic MCI and very mild Alzheimer's disease.

Clinical implications. The focal prospective memory task scores in Study 1 successfully classified the MCI status for almost 80% of participants. The next logical step is to adapt our focal task for use in clinical settings and incorporate it into a standard diagnostic procedure of assessing cognitive impairment in older adults. Our results showed that there were some important differences between memory complaints of MCI individuals and healthy older adults and these findings can also be used in a diagnosic process of MCI in the future. Finally, keeping a diary of memory failures may have beneficial effects on psychological well-being of MCI individuals.